THE CONDOR

A Magazine of Western Ornithology

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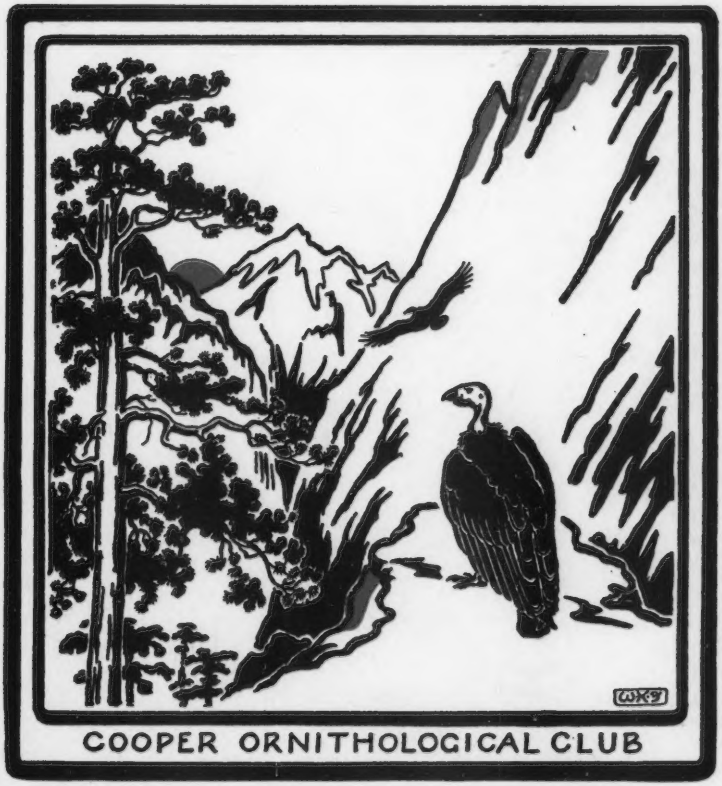

COOPER ORNITHOLOGICAL CLUB

THE CONDOR

A Magazine of Western Ornithology

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THE CONDOR

VOLUME XXXIX MARCH-APRIL, 1937 NUMBER 2

THE GOLDEN EAGLE IN SAN DIEGO COUNTY, CALIFORNIA

WITH FIVE ILLUSTRATIONS

By JAMES B. DIXON

The Golden Eagle (*Aquila chrysaëtos*) is a common resident bird in San Diego County, California. This article sets forth my observations on this bird during the period 1900-1936, including some data as to sizes and numbers of eggs laid during the lifetimes of two pairs.

On the map (fig. 14) each area shown is the feeding range of a pair of eagles. The only feeding area in which the nesting site has not been located is the one between areas 7 and 13. I have good reason to believe that the entire coastal area in San Diego County is just as thickly populated with eagles as the part shown in figure 14 which shows the feeding areas of 27 known pairs. The numbers as shown indicate the sequence in which the nesting sites were located. The lines were drawn from data gathered over 36 years' experience with the birds in the field and are accurate for the time the nesting site of each was located. These areas vary slightly with changing pairs, much as land areas owned by early settlers change; but in the main they remain substantially the same. The areas have been computed; the minimum is 19 square miles, the maximum, 59 square miles, and the average for the 27 is almost exactly 36 square miles, the equivalent of a township.

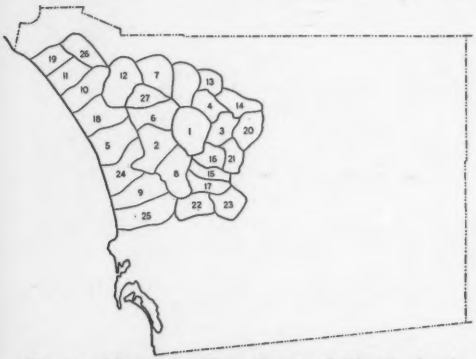

Fig. 14. Map of San Diego County, California, showing known feeding areas of 27 pairs of Golden Eagles. Sizes of the numbered areas, in square miles, are as follows: 51, 47, 25, 24, 48, 36, 39, 46, 48, 39, 32, 52, 19, 27, 19, 21, 23, 46, 24, 32, 21, 30, 34, 46, 59, 33, 24; average, 36.

Area 15 is situated on the south slope of Palomar Mountain and varies from 600 feet to almost 6000 feet in elevation. The actual hunting area exposed is much more than 19 square miles as measured on the level. Contrasted with this is the 59 square miles shown in area 25 which consists of level areas much of which is in grain and other annual crops. Where areas are planted to trees or cropped, or otherwise changed from their natural status, the feeding areas show an increase in acreage. This is shown by areas 1 and 12, both largely level valley and surrounding foothills highly developed to orchards and permanent improvements. By this change in natural conditions the birds have been forced to take in more territory.

Boundaries of the area claimed by each pair of birds are definite and this area is handed down from generation to generation; the death of one bird of a pair does not affect the status of a given area. If both birds are destroyed at the same time the area is open territory but does not seem to remain so for any length of time. This would indicate an ample supply of birds of breeding age in the region. If one of a pair is killed the survivor will secure a new mate soon. One female was caught in a steel trap in December and was killed in being removed from the trap. By the following February 20, a new mate had been secured and a set of eggs deposited.

Fig. 15. San Luis Rey River Canyon, San Diego County, California. Golden Eagles from area 3 nest in cliff at lower left; birds from area 4 nest in cliff at right of center. Photographed in March, 1929.

Referring to the size of eggs and the number of eggs laid over a twenty-year period by two pairs of eagles, we find a fixed and definite decrease in the size of the eggs as the birds increase in age. This decrease is surprisingly consistent in ratio as shown by the difference in size of the first and last egg laid in each set. The third egg in three sets has been ignored as to measurements. One pair laid three sets of three eggs in twenty years and the other but one. There is an increase of shell thickness with the decrease in the size of the egg, and the actual volume of shell changes but little from the first to the last egg. These records were taken from birds residing in areas 1 and 2. The eggs of the birds of area 1 were typical in every respect, whereas the eggs of area 2 were abnormal in size and also they were always infertile. Area 1 had four distinct nesting locations in widely separated parts of the range, and eleven nests. Five of these nests were in cliffs and six were in trees. Area 2 had four distinct nesting areas in widely separated parts, and twelve nests. Four of these were in cliffs and eight in trees. All nests in trees were in oaks, except two in eucalyptus.

Eggs are deposited, in this area, as early as the first week in February and as late as the first week in March. If for any reason the first laying is destroyed, the birds

will invariably deposit a second set, sometimes in the same nest but usually in another nest. The period between layings is 28 days. About one set in ten will consist of three eggs per set, and about the same percentage of sets of one egg are laid. I have known

Fig. 16. Golden Eagle's nest in oak tree in area 2; R. M. Barnes at nest. Photographed in March, 1912.

where third and even fourth sets were laid in one season. This will occur apparently only where food conditions are favorable and where the birds are in the prime of life.

A nesting location is generally on the margin of the hunting area where air currents are favorable to slow flying and landing at slow speeds. Air currents are important in the life of an eagle as shown by their taking every advantage of existing

ones. This is perhaps best illustrated by the fact that every pair will have a favorite location for elevating and this is nearly always over a cone-shaped peak where the currents are ascending. Again when they are going home with a kill they do not always fly directly home but will often travel due east until they reach elevating currents which will take them up to the desired height to cross intervening ranges of hills. They know all these spots and I have often seen one kill a squirrel and take

Fig. 17. Nest of Golden Eagle in oak tree in area 2. Photographed in March, 1912.

the ascending air current route home although it was much farther than a direct route.

Nests are composed of light, dead brush for a platform, dead stalks of the Spanish dagger, dried-up bushes of wild alfalfa, oak or sycamore sticks of considerable size, and almost any dry material that is within reach and strikes the fancy. Nest building is usually done between 10 a.m. and 1:30 p.m., or after the morning hunt is over. The linings of the nests may be carried for long distances but usually are taken from near the nests. The one thing that seems necessary is the dry last year's leaves of the Spanish dagger, with the needle-like hard points. Eucalyptus and oak leaves are used. Through several weeks of sitting, the incubating bird shreds these hard dagger

leaves into a soft blanket-like mat for the lining next to the eggs, and by the time the eggs are hatched the hollow is well formed and often the lining can be lifted out in one piece much like a blanket.

Eagles do not nest year after year in the same nest as generally reported. Even if they have several nests in a given nesting location they circulate around in the vicinity and leave a nesting location and move to another if an abutting pair en-

Fig. 18. Young Golden Eagles in a cliff nest in area 1, July 4, 1921. The standing bird left the nest soon after this picture was taken.

croaches. They are jealous of their feeding range and often nest close together as measured by air distance and often where they can watch each other. This is often practiced by pairs 3, 4 and 14, and also by pairs 2, 8 and 9. Their nests are sometimes within two square miles and each pair radiates out over its respective hunting area but nests where it can keep an eye on the others. The worst insult one pair can give another is to steal sticks from its nest. The nest from which the stick is taken may be an old one which has not been used for years; but that does not seem to make any difference. The battle is on, and if it takes place with considerable wind blowing, it is a sight worth seeing. Twice I have seen three pairs involved in such a battle and often have seen two pairs involved.

Nest building begins with the first heavy fall rains and continues through the winter. New nests are often built, but these are not used the year they are built. I have often noticed a nest being built that I was sure was a new nest; but invariably the birds would leave this nest for an older used nest when egg-laying time arrived.

The female being larger and stronger than the male, seems to have full say as to the nest location and for no apparent reason will change from one nest to another. Several times I have watched a female look over various nesting sites, one after the other, and finally seem to decide on one of the five or six places she inspected. The male at this time is aggressive and shows off his powers of flight, the commonest of which is to get up about 2000 feet and dive in loops, one right after another in a line toward some other eagle in the far distance. Sometimes at the top of the swoop he will make almost a right angled turn, but usually the dives are directed at a bird in the distance and seem to be a challenge or a warning to the latter to stay on his own hunting ground.

As a rule, the eagles are tolerant of other predatory birds and simply ignore them. Almost every area shown on figure 14 contains one or more pairs of nesting Western Red-tailed Hawks and Pacific Horned Owls. In one instance a pair of eagles moved onto a cliff where a pair of Duck Hawks had made its home for years and persistently fought with and outfought the Duck Hawks, forcing them to leave. The eagles are still nesting there. Previous to this occurrence I had thought the Duck Hawk was supreme in maintaining its home.

If times are hard and food becomes scarce, and it becomes a case of the survival of the fittest, the eagle will kill breeding pairs of Western Red-tailed Hawks and Pacific Horned Owls. I do not know that all pairs will do this but I have actually seen pairs of eagles hunt down and kill both the hawk and the owl. Both of the birds worked together and there could be no doubt as to their intentions. Young Western Red-tailed Hawks of the previous years' hatch but which had not reached fully mature plumage were more often killed than full-plumaged breeding birds.

One peculiar habit, and this has been noted in several instances, is that breeding birds roost some distance from their newly lined and rebuilt nest. On cloudy days birds will often go to roost for the night as early as 3 p.m., but they are out with the crack of dawn.

Of the two birds, each does its share of incubating, and the regular shift of incubation starts within 48 hours after the last egg is laid and continues during the incubation period. If the male brings in a kill for the female, she usually leaves the nest to receive it. This is much more apt to occur in the period of laying. Several days usually elapse between the layings of the eggs, and the female stays on or around the nest and seems to know just when to expect the return of the male. I have watched them when the female would begin clucking and calling for some time before the male put in his appearance. The pitches of their calls are enough different in tone to be distinguishable, and sometimes the answering call of the male is heard before the bird can be seen. The male drops out of the sky directly overhead or comes in around the mountain-side, with something for the female. After incubation is under way, this procedure does not occur. The male drops into the nest on a high or low dive and the female leaves almost immediately. Unless you knew, you would think the same bird left the nest that went into it.

The question of how an eagle slept came up once and in order to determine this matter we went up to a nest one night where we knew an eagle was incubating. Cautiously working out onto a point on the cliff where a good view of the nest could be had, we flashed a strong spotlight on the sitting bird. Our first impression was

that the bird was dead. Her head lay forward on the nest edge directly in front of her, her wings were half open and spread out in a drooping position at her sides. We were much disappointed, as we were sure she was dead; but we decided to find out, so threw a small pebble over toward the nest and began talking, whereupon the bird woke up and left the nest in a great hurry. We thought this experience might cause the birds to desert the nest but they did not do so. Since then I have found them in this same position during the day and apparently sound asleep on the nest and have had to drop pebbles down on their backs to wake them up. Birds vary a great deal as to wildness. The ones around civilization become very tame in some instances and usually wind up by being shot by some passing hunter.

Food supply seems to be the center around which everything in the life of the eagle revolves. We have given careful attention to the food in nests under almost every condition from ones just ready for eggs to ones with full-grown young. The best time to get a check on the food supply is when the young are just hatched and too young to eat much. At this time a large amount of food often accumulates. Squirrels, both ground and tree, are the first and foremost item of food. Next in importance are the three kinds of rabbits found in this region. Ranking third are the various water birds such as the coot and the larger ducks. The eagles are not particular, as we have found skunks, gray foxes, house cats, young pigs, young deer, and young goats in or at the bases of nests. Eagles have been accused by the cattlemen here of killing newly born calves, but I have never seen any definite evidence of such action.

The birds are reputed to remain mated for life. I doubt this for the following reasons. In several instances I have seen an unmated female, unsuccessful in securing a mate, go ahead at the breeding time and build her nest and lay her eggs (infertile), then proceed with securing of a mate as soon as possible. During this period she was not above trying to steal an adjoining mate and would always secure a mate from some place. This has been particularly true if the area in which the female lived was a productive one as to food supply. The eggs of the various females show great individuality and, you might say, a family resemblance. This is so true in this area that recently, when a collector challenged this statement and said he had six sets of eggs he had recently collected in San Diego County, I was able to tell him from the eggs without a single error where he had taken each set. Basing my opinion on this difference or individuality in the eggs of a given female I feel sure that they change around some and that both birds of a pair shift or trade areas, or the female alone moves into a new area.

Another thing I have witnessed on several occasions is the banishing of an aged bird of a pair which is no longer able to carry on and has been supplanted by a new and younger mate. In such cases the banished bird will hang around the margin of the food area and is much harassed by one of the ruling pair though tolerated by the other bird of the pair. I have also seen this transpire with young birds of the previous year which insisted on returning to the area from which they had been driven the previous fall. Invariably it has been the larger bird of the old pair that has done the chastising and the smaller or male bird that tagged along but took no part in the fight and appeared in some cases to condole with the chastised bird to the extent of flying over and sitting alongside it; but after a short time the adult would return to the bird which was doing the punishing and go off with it.

Some peculiar hunting habits of the eagles seem worthy of recording. An old female in area 2 had been shot by duck hunters and the end of one wing injured. By tipping the opposite wing she was still able to fly but not so well as formerly and

she had to make up in wisdom what she lacked in flying ability. I have seen her do the following things which would indicate an ability almost to think.

Her nest was high in an oak on a rough mountain-side overlooking a freshwater lake. This lake had a barbed wire fence around its highwater margin. On the wires of this fence trailed creeping vines such as wild morning glory, making in effect a screen of the vines and fence combined. On this lake many coots were living and they often fed up from the lake shore under this fence. The old eagle would leave her nest on the mountain-side high above the lake and sail south at a high elevation as though leaving the area, for a distance of about a mile, then would drop down to the lake level and, paralleling the fence but between it and the lakeside, she would fly slowly along about three feet off the ground until she had put herself between the coots and the lake, whereupon she would rise over the fence and pick up a coot before it knew what had happened. She did this time after time and the coots never seemed to learn that this was a dangerous place in which to feed.

This bird also did the following: She made a pass at a ground squirrel but was too slow to pick the squirrel up although she tried hard. Clucking and talking to herself she waddled up to the top of the dirt mound and apparently went to sleep perched well back out of sight. I could see her turning her head as though listening but she remained very still. Soon the squirrel came out of its burrow and began to forage again. The eagle remained perfectly quiet but movements of her head indicated that she knew the squirrel was there. When the squirrel got far enough away from its burrow, the eagle quietly took wing and, dropping off the hillside above, easily picked it up and returned to her nest with it.

Another bird was seen to use a truck full of woodcutters to stalk a bunch of coots near the lake. Flying alongside of the truck and only a few feet above the ground the bird paced the truck until it was in a position to strike, whereupon the bird wheeled rapidly over the truck and struck down a coot within a distance of fifty feet.

Another pair was hunting and one missed a squirrel which ran into a heavy bush. Squealing in anger the bird took hold of the bush with its feet and beating its wings against the bush seemed to try to scare out the prey. Meanwhile the other bird was waiting, ready to strike if the prey flushed. They were unsuccessful in this ruse as apparently the squirrel was an experienced one and did not flush. One of this pair would follow a man and plow team and when the horses would flush a squirrel she would pounce upon it while the squirrel's attention was directed to them. This bird would then sit within a few feet of the plowman and proceed to eat the squirrel. When the man stopped his team and playfully snapped his whip at the eagle, she would only retreat a few feet and proceed to eat. I went down and talked to this man and he told me that he had lived for 54 years on this ranch and that there had always been a pair of eagles there.

Summary.—The average area in the San Diegan district of California to support a pair of Golden Eagles appears to comprise close to 36 square miles, or the size of a township. The age of one bird is rather definitely established as 30 years, as shown by the record of the female in area 1. Eggs of young eagles are larger and more heavily marked than eggs from older females, and the eggs gradually decrease in size and increase in thickness of shell. The birds are beneficial on the whole, being heavy feeders on mammals objectionable to the agriculturist. Eagles in this region are better able to survive than most predatory birds in that they are shy and retiring by nature and live principally in unsettled sections.

Escondido, California, December 17, 1936.

CALIFORNIA CUCKOO IN THE SAN BERNARDINO VALLEY, CALIFORNIA

WITH ONE ILLUSTRATION

By WILSON C. HANNA

It was my good fortune and pleasure to live in the San Bernardino valley when there was always a substantial stream of water in Warm Creek and when the Santa Ana River had some surface flow most of the year. Both of the streams flowed generally toward the southwest and were between San Bernardino and Redlands, the creek being north of the river. The creek joined the river at Colton and the stream then continued south of Colton and on west of Riverside. The heavy floods of some winters spread water over large areas and provided miles of cottonwood and willow thickets along both streams. It was a delightful place for birds and an ideal one for the California Cuckoo (*Coccyzus americanus occidentalis*). In fact, it was in a willow tree here that Frank Stephens first found this species nesting in 1882 (Bendire, Life Histories of North American Birds, vol. 2, 1895, p. 25).

In contrast with those good old times we now have very little water in Warm Creek and seldom any surface water in the Santa Ana River, the large thickets have been replaced by farms and pastures, the trees cut down, and the evergrowing population has crowded in on the old haunts of the cuckoos to such an extent that if they come here now at all they must be exceedingly rare. I have seen none in over four years. Forty and more years ago most of the boys had collections of eggs and we all were acquainted with the cuckoo, most of us having an egg or so. I remember that I paid Wesley H. Beach, an older boy, fifty cents for my first egg and as this was exactly twice as much as my daily wage as errand boy at the fruit cannery it is evident that I considered this kind of egg to be rare even then.

My experience with the California Cuckoo in this valley indicates that it nested only between about 850 feet and 1100 feet above sea level and never more than a few hundred yards from water; in fact I have never seen the bird outside of this range. Ideal thickets for nesting seemed to be damp willow thickets mixed with cottonwood trees and with heavy underbrush of nettles, wild-grape vines, and cat-tails. Among abundant nesting birds in these thickets with the cuckoo were usually Western Traill Flycatcher, Willow Goldfinch, Russet-backed Thrush, Black-headed Grosbeak, California Yellow Warbler, California Least Vireo, San Diego Song Sparrow, Coast Bush-tit, Long-tailed Chat, San Diego Towhee, Black-chinned Hummingbird, San Diego Red-wing, Western Mourning Dove, House Finch, and, in more recent years, the Dwarf Cowbird. Among the mammals were rabbits and skunks, the latter not being as common as we thought.

Mr. Fred Frazer has given me great assistance in locating nests of the California Cuckoo. Our usual procedure was to go into thickets that looked promising and listen for the cuckoo as we looked for the nests. If we heard a cuckoo we made a most diligent search for the nest and if not we moved on to another thicket. The sound of a cuckoo was, we thought, like the rapid pulling of corks out of bottles and we were often surprised to find that the bird was not far away when the sound actually seemed to be distant. The only other call we noticed the birds give was heard once when a bird flushed to the ground crying rapidly like a cat and at the same time feigning an injury. We could not find nests by seeing birds go to them; but their excited actions often indicated that a nest was near and encouraged us to go through the shrubbery infested with caterpillars, which sometimes raised lasting welts on our arms and necks that were not soon forgotten. Numerous other birds' nests were examined

in these thickets and in no case did we find any cuckoo eggs in them, or damage that we could attribute to the cuckoo; neither did we ever find the cuckoo using an old nest of another bird, with the possible exception of a dove. We never found any cowbird's eggs in a nest of the cuckoo.

I have rather complete notes on twenty-four nests that I have examined in the field, six along Warm Creek and eighteen along the Santa Ana River, and with two exceptions all were in willow trees. In one case the nest was 11 feet up in an alder tree next to the trunk, and in the other case 30 feet up in a cottonwood tree on top of a bare limb partly supported by a few twigs and therefore conspicuous. The last mentioned nest was ten feet higher than any other nest I have seen. Six of the nests in willows were either partly supported by or covered with wild grape vines, another nest was well concealed in the center of live mistletoe, while still another was well hidden in poison oak that was growing over the dead willow tree. A few nests were placed next to the trunks of trees, but by far the most common location was well out on a horizontal or leaning limb. The average height above ground or water was less than thirteen feet and two were only four feet up. A good supply of rope and a ladder were necessary for examining some of the nests without disturbing them or the surroundings.

Nests were always loose structures, of coarse twigs for a foundation, sometimes with a little superimposed grape-vine bark, cottonwood bark, or rootlets. In some cases there was no other lining and eggs could be seen through the bottom of the nest; but usually there were fresh or old leaves, bark strips, or willow cotton. In only one nest was there a feather in the lining. Often the nests were much longer in one dimension than the other, in one case four inches wide and twelve inches long. The average outside diameter was 8.2 inches, inside diameter 2.6 inches, outside depth 2.7 inches, and inside depth 0.8 inches.

The eggs have thin, dull shells and are pale niagara green in color, without markings, except sometimes for a faintly mottled appearance. They vary in size and shape, often in the same nest. The most common shape was elliptical oval but in some one end was more pointed. From two to seven eggs have been found per nest, with an average of 3.96. The most common numbers were three and four and there are single records each of six and seven. The earliest nesting date that I have is May 29 (1923), the latest is July 10 (1921), and the average is June 23. Eggs in a nest often show different degrees of incubation. The average weight of ninety eggs was 9.76 grams. The smallest egg was in a set of five with these weights in grams: 10.11, 9.84, 8.57, 7.96, 3.54. The largest egg was also in a set of five with these weights: 12.64, 12.35, 11.86, 9.24, 8.76; the largest egg measured 1.37 by 1.02 inches.

The most unusual set of seven eggs deserves more than passing mention and it is still a mystery to me how such a nest could hold the eggs. Mr. Fraser discovered the nest when we were searching along the Santa Ana River, on June 20, 1924. The nest was only four feet above water, on a horizontal limb of willow sapling among cattails. The weights of the eggs in this set were 12.31, 10.67, 10.37, 9.91, 9.47, 9.06, 8.79 grams, and the largest egg measured 1.37 by 1.02 inches. The photograph showing this nest and set of eggs could not be taken until they were removed from the tree (fig. 19). This set and nest were collected and preserved.

Some brooding birds would not flush until twigs near the nest were moved, but I was never able to touch a bird. Most of the birds flushed when the nest was approached within a few feet and three resorted to the "broken wing" deception often practiced by doves. Birds usually returned to the vicinity of the nest within a few minutes after leaving and they were often joined by their mates in making some fuss

in the near-by shrubbery. While birds upon flushing from nests often slipped to the ground, I do not remember seeing them on the ground at other times. They are usually seen among the branches of trees, but one I saw perched on a high telephone wire.

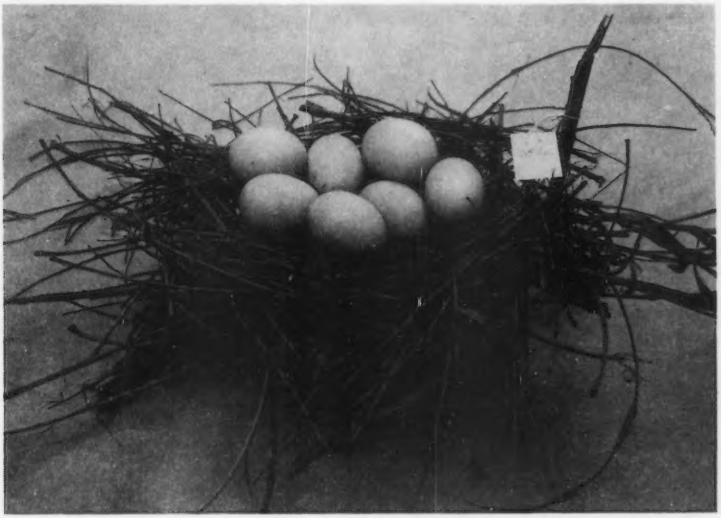

Fig. 19. Nest and eggs of California Cuckoo, taken June 20, 1924, at Colton, California.

One late afternoon Mr. Frazer and I, when in a mixed grove along Warm Creek, had an opportunity to see some of the courting actions. We had been hearing the cuckoos and had searched in vain for the nest; finally seated on the ground we wondered where the nest could be. We would hear one cuckoo and then another at different points; then one bird came and perched on a horizontal limb about fifteen feet above us and gave its usual call which was answered by its mate. Soon both birds were side by side on the same limb and the male mounted the female. After what seemed a very long time I took my watch to time them and we both agreed that the coition had lasted about eight minutes. The male returned to its perch on the limb for a few minutes and then mounted several times but for shorter periods. During this activity they did not utter their calls but began again after flying back to other parts of the thicket on their quest for caterpillars. We could not find the nest and thought that it had not yet been constructed.

It is my opinion that the greatest enemy of this bird in this vicinity is man who, by clearing the land and using the water, has destroyed its food supply and breeding territory. Wind probably destroyed a number of nests, or at least accounted for some eggs that were found on the ground. A few nests were probably upset by cattle pushing through the thickets and pulling at grape vines growing over willow saplings. We blamed cats for the lack of birds in some likely looking thickets, but we had no positive proof for this. It seems improbable that the California Cuckoo can ever again occur plentifully here as formerly, and I sincerely hope that other places inhabited by this interesting bird will long remain suitable for it.

Colton, California, September 10, 1936.

WALTER BRETT: 1836-1917

WITH ONE ILLUSTRATION

By J. H. FLEMING

California has had many pioneers in natural history; some are remembered for their writings, others because of the survival of their collections. Among the naturalists working in California, half a century ago, was one of whom nothing has been written.

Walter Brett was born in London, England, April 13, 1836. He was educated in Belgium and graduated from an agricultural college. Returning to England, he later emigrated to Canada in August, 1863, settling in Hastings County, Ontario. In a letter dated November 20, 1916, he wrote: "I arrived in Belleville 60 years ago, went up the Hastings road, and settled in Tudor township, farmed with rifle and shotgun; it was easy in those days to get fish and meat." Here he remained six years, removing to Middlesex County and Niagara Falls, Ontario. (See fig. 20.)

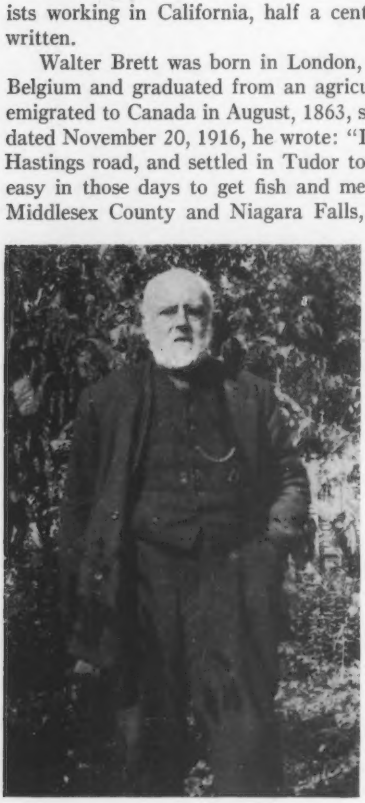

Fig. 20. Walter Brett, photographed on October 10, 1915, in his eightieth year, at Niagara Falls, New York.

Of his diary and field books he wrote: "From 1871 to 1888, I kept a log book, a sort of general diary. It was not till February 3, 1888, that I commenced a regular systematic system of measurements and records." The records were entered in surveyors' field books, the numbers ending at 1587 in 1905.

The measurements taken of birds were, length, extent, wing, tail, thus, 4.90 x 6.80 x 2.15 x 2.10 in inches and hundredths; usually added were tarsus, middle toe and claw, and bill, thus, T^s 85, M.T.C. 70, Bill 45. To the skin when made up was attached a gun wad with the catalogue number. The permanent label had locality, date, sex, scientific name, field number and A.O.U. number on the front, the measurements on the back together with any remarks as to condition, altogether a very modern label and a well made skin.

The travels of Walter Brett are clearly indicated by entries in his field books. Forty-three birds were collected at Niagara Falls, Ontario; and on May 12, 1888, collecting began at San Diego, California, and continued north till the first entry of "Clear Lake, Lake County" is made on July 20, and three days later the last entries in California, "Trout Dale, Napa County," with the entry "This collection all stolen, 44 to 147, in Wyoming." Returning to Ontario in August, the two following years were spent there and 394 birds collected.

Collecting in California really began when Brett settled at Lakeport in Lake County, January, 1891; here he remained until April, 1892, and after a trip east, he

again settled at Lakeport, in November, remaining until March, 1894. The three years spent in California resulted in an excellent series of bird skins. In 1892 Brett began a collection of mammals, with the measurements taken in inches and hundredths, but commenced the use of millimeters in January, 1894, though continuing to measure birds in inches as before. The mammal skulls were numbered and kept separate.

Brett was in 1892 a member of the California Academy of Sciences, the California Zoological Club, and a subscriber to Zoe. He was also in correspondence with the Smithsonian Institution: with Ridgway about the form of cormorant breeding at Clear Lake, which Brett believed to be new; with True about mammals; with Stiles about bird parasites; and I find a letter from Bendire asking for eggs of the White-tailed Kite. All this correspondence was between the years 1891 and 1895.

From California Brett removed to Halifax County, Nova Scotia, and remained there nearly five years; then back to Hastings County, Ontario, and in 1900 to Huns Valley, Manitoba, where collecting ceased after July 14. The field books record 1586 bird skins and 237 mammals collected between 1888 and 1900. In all, Brett collected 297 species of North American birds.

In a letter of November 11, 1910, Brett wrote: "I am on the verge of 74 years. I have no laurels to wear. But my bird life in the suburbs of London, England; then in Flanders, the Belgian Ardennes, and ultimately 40 years in North America, these are glorious years to refer to." Writing in November 3, 1916: "I am writing to let you know that I have reached 80 years and 6 months old, also my bird collections stayed at No. 1587, in Nova Scotia 1905."

I spent a day with Walter Brett in December, 1916, at Trenton, Ontario. He had written, "I will meet you, look out for an old chap with corduroy pants void of all fashion." I found him, as his letters had indicated, the perfect type of an English sportsman-naturalist, interested in wild life and in collecting, but beyond that a keen student of nature. Brett felt that he could no longer care for his collection and it passed into my hands by purchase; there were 1000 bird skins and 135 mammals. The birds were absorbed into my collection, and I have recently given the mammals to the Royal Ontario Museum of Zoology.

Walter Brett died at Bedford, Nova Scotia, September 18, 1917, aged 81 years and 5 months, and was interred at Trenton, Ontario. I am indebted for details of Brett's life to his two sons, both of whom shared their father's interest in natural history, Mr. Richard C. Brett of Steenburg, Ontario, and Mr. Harry W. Brett, of Niagara Falls, New York.

Toronto, Ontario, October 12, 1936.

NESTING DISTRIBUTION OF THE TRI-COLORED RED-WING

WITH MAP

By JOHNSON A. NEFF

Described by the taxonomist as a species of Central or South American origin, the Tri-colored Red-wing (*Agelaius tricolor*) is one of the most interesting of American bird species. In the autumn of 1930 the writer was assigned to the Sacramento Valley district of California to investigate the relationship of blackbirds to the rice industry. During the autumn and winter of 1930-31 general studies in the vicinity of Marysville, Yuba County, occupied the entire period; although a few Tri-colored Red-wings

were collected, the population was very light until late March, 1931, when great numbers of this species returned to the district. As studies continued, their immense numbers and unusual habits aroused keen interest, which was intensified by the field work of each succeeding season.

Perusal of ornithological literature has not satisfied the interest. Many records are old, in fact most of them date back to the days prior to widespread agricultural development in California. Up to 1930, only twenty-six published articles described specific nesting colonies of this species. Only two or three of them give so much as a hint as to the density of population in the days before industrial and agricultural development greatly changed the topography of much of the State. Great gaps appear in the geographic distribution of the species as represented in the literature, and for many of these there seemed no logical reason except that these areas were not sufficiently known by ornithologists.

From the preliminary studies of the species, came a desire to learn something of the present status of the bird. Several questions arose: What has been the effect of the development of California? Has industrial and agricultural development reduced the area favorable to nesting of this species? Has the species proved adaptable to changing conditions? About this time came criticism of the Biological Survey, based largely upon the supposed scarcity of this bird; indeed, it was charged that the species might even then (in 1931) be nearing extinction.

The original plan was to arrange for a complete survey of the nesting range of the species in California during one single nesting season. A start was made upon this, but we speedily learned that Tri-colored Red-wings existed in immense numbers, and that their nesting range covered so great a part of California that such a survey was humanly impossible. Observations continued during the ensuing six-year period covering whatever part of the range the time and funds permitted each nesting season.

ACKNOWLEDGMENTS

The writer greatly appreciates the assistance of a large number of persons who have given aid in this study. Without their assistance in the field the records could not have been gathered. Dr. Joseph Grinnell furnished a bibliography of the species, which has been of great value. Dr. Tracy I. Storer has been a major coöperator, with suggestions as to methods of handling the material and with his critical inspection of the manuscript. Mr. James Moffitt, of the California Academy of Sciences, made valuable suggestions with regard to presentation of material. The continued interest and coöperation of W. C. Jacobsen and H. A. Hunt, of the California State Department of Agriculture, has been invaluable. To the Chief of the Biological Survey and to others in the Washington office of the Bureau, appreciation for interest and assistance is also extended.

HISTORY

Agelaius tricolor was first collected in the vicinity of Santa Barbara by Nuttall in 1836. The original naming of the species is contained in Audubon's folio "Birds of America" (1837, pl. 388); the original description is contained in his "Ornithological Biography" (1839, p. 1).

In 1849, A. L. Heermann arrived on the Pacific Coast; for a time he was attached to the Williamson survey of the Cascade-Sierra Nevada region. Under date of 1853*b* (p. 268) he gave the first nesting record of the species, which is quoted here:

> AGELAIUS TRICOLOR, Aud. This species collects in flocks of thousands in the fall season, and is shot in large numbers for the market. I once found one of their breeding places in the northern part of California, near Shasta city. They had chosen a space of several acres, covered with thickets of alder and willow bushes, in the immediate vicinity of a stream of water. The nests were placed so closely to each other that I could often, without advancing, put my hand in six or eight nests.

. . . When I discovered this breeding place the young were nearly all hatched, and nightly the wolves and foxes came to devour those which had fallen from their nests during the day.

This locality was in Shasta County, apparently on the Cottonwood Creek that is the present boundary between Shasta and Tehama counties, for Heermann wrote of making excursions to such a creek rising in the Coast range; the old mining town of Shasta, 6½ miles west of Redding, is not far from some of the tributaries of this stream. Although Heermann (1853*a*, p. 17) catalogued eggs of the Tri-colored Red-wing in the Academy of Natural Sciences of Philadelphia, the first specimens of eggs in the United States National Museum were collected near Lakeside, San Diego County, on May 4, 1890 (Bendire, 1895, p. 458).

The A. O. U. Check-list of North American Birds (4th ed., 1931, p. 305) gives the range of *Agelaius tricolor* as follows: "Valleys of northwestern Oregon (west of the Cascade Range) south through California (west of the Sierra Nevada) to northwestern Lower California."

The range of the Tri-colored Red-wing extends well into Lower California. A. W. Anthony (Bendire, *op. cit.*, p. 467) reported it as "rather common along the northwest coast, breeding in all fresh-water marshes; and in San Rafael Valley Mr. L. Belding found a large colony nesting in the tules, May, 1885." Since the occurrence of the species in Mexico is incidental to the object of the present paper, it is not covered in detail here, although several other records for that area have been published since 1885.

Oregon is included in the range of the species on the basis of the following records: Bendire (*op. cit.*, p. 456) wrote: "Here [near Klamath Falls] it was first met with by Dr. J. S. Newberry, and later by Dr. J. C. Merrill, United States Army, who noticed a few among the common Red-winged Blackbirds there but did not find it breeding. I failed to observe it while stationed at Fort Klamath, and it is probably uncommon." Woodcock (1902, p. 64) lists it as having been observed "near Portland" by H. T. Bohlman, and wrote: "I have in my collection three specimens, one male and two females, which I think are referable to this species;" he did not list it as a breeding species. Numbers of qualified ornithologists have worked in Oregon in the interim; none listed the species in Oregon, and most ornithologists were ready to call these early identifications erroneous; there was no specimen in any museum or collection; the fate of Woodcock's supposed specimens is unknown.

The range in California is given by Grinnell in 1915 (p. 104) as follows:

Common resident locally in the interior valleys west of the Sierran divide and south through the San Diegan district. Recorded north to Shasta County, east to Lake Tahoe and near Weldon, Kern County . . ., and west to the coast district of central and southern California. The San Joaquin Valley seems to be now the metropolis of the species. Not recorded east of the Sierran divide, save as breeding at Lake Tahoe . . ., nor in northwestern California north of Marin County, where recorded only as a straggler . . . Westernmost breeding station: Sargents, Santa Clara County. . . .

Grinnell and Wythe (1927, p. 105) record the species as an irregular resident or straggler in the San Francisco Bay region, and list nesting colonies as follows: Point Reyes, Mowry and near Irvington, and Sargent. Willett (1933, p. 153) describes the species as "formerly common resident of lowlands [coastal southern California], breeding locally in tule marshes from the latter part of April through May. . . Now rare throughout former ranges in southern California, excepting in some sections of San Diego County. According to L. M. Huey and J. B. Dixon (MS), still nests plentifully, though irregularly, at San Luis Rey, Lake Hodges, Sweetwater, and Lakeside." By way of contrast, Bendire (*loc. cit.*) quotes a letter from F. Stephens concerning Los Angeles and Orange counties prior to 1895: "In summer it is somewhat rarer, but several colonies are known to me to breed in tule marshes from sea level up to an altitude of 1,500 feet."

PUBLISHED NESTING RECORDS

The following table summarizes the entire record of the species insofar as definite nesting colonies are described in the literature.

Date of Observation	Location	Habitat	Observer and Citation	Remarks
Prior to 1853			A. L. Heermann (1853*a*)	Sets of eggs collected in California
Prior to 1853	Near Shasta City	Thickets of alders and willows near stream	A. L. Heermann (1853*b*)	(See text)
1875	Saticoy	Nettles	J. G. Cooper (1880)	Hundreds
1872-3; May 22	Near Saticoy		J. G. Cooper (1875)	No statement of numbers
June 21, 1872	Santa Clara Valley (Ventura County)	Patch of nettles and briars in a pasture	H. W. Henshaw (1876)	Two hundred pairs
May 10, 1879	Near Stockton	Tules	L. Belding (1890)	An immense colony; nests averaged one to each square yard
May 16, 1883	Bernardino River		F. E. Blaisdell (Belding 1890)	
	San Bernardino		F. Stephens (Bendire, 1895)	Breeds in the valley
1884	Santa Cruz County		J. Skirm (1884)	Listed as a breeding species
May 4, 1890	Near Lakeside		(Bendire, 1895)	Collection of sets of eggs
Before 1895	Los Angeles County		F. Stephens (Bendire, 1895)	Several colonies
May 26, 1895	Near Sargent	Tule patch	C. Barlow (1900)	Small colony
June 12, 1896	On shores of Lake Tahoe		R. H. Beck (Barlow, 1901)	
May 8, 1897	Near Compton		G. F. Morcom (Grinnell, 1898)	
1900, late April	Near northern Madera County line	In tules, a patch 30 yards across at an artesian well	J. Mailliard (1900)	A large colony; hundreds of birds
May 9 to 21, 1905	Noted at various points from Stockton to Porterville, breeding		M. S. Ray (1906)	
Prior to 1907, April 30 to May 26	San Diego County, Escondido and San Pasqual valleys, Bernarda Rancho		C. S. Sharp (1907)	A district list; apparently several colonies recorded in this area
April 30, 1907	30 miles southwest of Fresno	In nettles, willows, foxtail grass, and on bare ground	J. G. Tyler (1907)	Hundreds in two localities about 200 yards apart
June 8, 1907	Near Letcher, Fresno County	Clump of rank tule	J. G. Tyler (1907)	About 200 nests
May 20 to June 16, 1907	Buena Vista Lake		C. B. Linton (1908)	Breeding colony
June 7, 1912	Buena Vista Lake		Lamb and Howell (1913)	Hordes
April 14, 1914	Rancho Dos Rios, Stanislaus County	Tules	J. Mailliard (1914)	Nesting area of several acres
1916	Near Los Banos	Tule and cattail	W. L. Dawson (1921)	Large numbers
May 27-June 13, 1916	Near Dos Palos	Swamps, tule and cattail	W. L. Dawson (1919)	Estimated 20,000 pairs
May 20, 1917; May 4, 1918; May 4, 1919	Near San Francisco (Newark, Alameda County)	Common nettles	B. W. Evermann (1919)	200-300 nests
May 7, 1919	2 miles southwest of La Grange	Cattails in dredger pits	Grinnell and Storer (1924)	About 25 pairs
April 2, 1921	Walker Basin, Kern County	Old dead tule patch	A. J. vanRossem, Dickey and vanRossem (1922)	About 20 pairs
April 17 to 20, 1926	Short distances north of Point Reyes	Dense growth of raspberry bushes	E. J. Booth (1926)	
May 20, 1931	12 miles northeast of Marysville	Willows and cattails	T. T. McCabe (1932)	
May 16, 1932	Near Anderson, Shasta County	Tule and cattails	Taylor and Neff (Neff, 1934)	(See text)
May 22, 1933	Near Glenburn, Shasta County	Tangle of *Rubus*, *Prunus*, and *Rosa*, on river bank	Olsen and Neff (Neff, 1934)	(See text)
June 13-16, 1933	26 miles north of Klamath Falls, Oregon	Nettle (*Urtica*)	Richardson and Neff (Neff, 1933)	(See text)
1933	Lakeside, San Diego County		Huey and Dixon (Willett, 1933)	Large number

No doubt local ornithologists and oologists have many records of the nesting of this species that are not available to the writer. One such is an extension of the recorded range. Prior to 1930, Jack Baker, Santa Rosa taxidermist, and Gurney Wells, found Tri-colored Red-wings nesting at Bodega Head, Sonoma County. Baker estimated there were about 1000 birds in the colony. Eggs and birds were collected; the writer has examined one of the specimens mounted in the collection of Agricultural Commissioner O. E. Bremner at Santa Rosa. This is at present the northwesternmost nesting record for the species.

Beck's record of nesting at Lake Tahoe, reported by Barlow (1901, p. 168) has been questioned. On April 7, 1936, I discussed this matter with Mr. Beck. While naturally he cannot recall the actual happenings of forty years ago, he sees no reason for questioning his record. Prior to 1896 he had collected extensively in the lowlands of California where this species was abundant. Following is the journal entry copied from Mr. Beck's original field diary; Tallac is the only locality mentioned on this date: "6-14-96. Lake Tahoe. Tricolored Blackbird. 2/5. In willows 1 ft. above water; 2 ft. of water. Nest mud bottom. Evidently last year on sides and top with lining of dry grass."

SIX SEASONS OF STUDY

Estimates of population are notoriously inaccurate, and are subject to wide variations. Dawson (1921) wrote of the ease of underestimating the number of Tri-colored Red-wings in a cattail or tule marsh; he described having counted from sixteen to thirty-two nests from one stand in a thick marsh. Heermann wrote of being able to put his hand into six or eight nests from one position. Belding (1890, p. 122) stated that in one colony the nests averaged one to each square yard. Taylor and Miller (Taylor, MS) counted the nests in a strip of cattails containing 1200 square feet; the occupied nests averaged one to each eight square feet.

The writer has noted almost every possible variation in density of population. Twelve nests were observed in one small willow, and thirty-six were counted in one clump of about four tall willows growing from the same root. In cattails, nests have been noted at least as numerous as one to each three square feet; from one stand in thick cattails, without moving the feet except to rotate, we counted from sixteen to thirty-six nests; the average of many counts ran well over twenty. A count made in a marginal colony averaged one nest to each nine square feet. In another colony sample counts, in a number of ten-foot squares, ranged from sixteen to thirty-four nests.

In the observations reported here several methods of arriving at population numbers have been used. The active population of various colonies has been checked again and again. Flight-line counts have been made at certain colonies, counting the birds flying in or out across a base line for

Fig. 21. Nesting range of Tri-colored Red-wing, by counties, in California. Triangles indicate nesting records from published sources prior to 1931; solid spots indicate distribution, 1931-1936, as shown in this report; circles indicate birds observed in nesting season, 1931-1936, but nesting site not found.

five-minute periods; checking the distances from base line to feeding ground or nesting site, and the probable time required for each trip, gave some idea of numbers. When time and terrain permit, the colony site can be stepped off, or estimated area recorded; sample counts then permit a reasonable estimate of numbers.

In my work a combination of all methods has been utilized in order to arrive at reasonable estimates. One common method was to walk into the cattails of a colony at random, then to stop, set the feet together, and turn around, counting each nest that could be reached. The average-sized man can hardly count the nests on more than eighty square feet by this method. The average of a large number of such counts in various marsh colonies has been close to twenty nests, or one to each four square feet. For the sake of conservatism, in many instances the estimated nesting population has been obtained by using the arbitrary figure of *one nest to each ten square feet*, although in many of the localities common sense told the observer that the nests were far closer together. Estimates are given in round figures, for the best that can be expected is a general idea of relative numbers.

Estimated Nesting Population of *Agelaius tricolor*
(Figures represent thousands of nests)

County	1931	1932	1933	1934	1935	1936
Butte (California)		28	106	32	3	4
Colusa		32	16	37	3	5
Fresno						.1
Glenn		68	61	282	4	4.5
Kern					2	.5
Kings		2				
Lake						.02
Los Angeles						.5
Merced		50	58	2	37	10
Monterey		4				2
Orange						.25
Placer			1			1.5
Sacramento		121	101	80	1	15.0
San Diego		3			.1	2.25
San Joaquin					.1	3.75
Santa Barbara						3
Santa Cruz		.5				
Shasta		18	1			
Solano		.006				
Stanislaus		12			8	12.5
Sutter		10	13	6	1	3
Tehama						.75
Tulare					2	
Yolo	10	38	3	2	10	2
Yuba	113	2	7	50	5	5
Klamath (Oregon)	6		.05			
Annual totals	123	388.5	367.	491.	67.2	63.4

Grand total, 1,500,100.

The following tables summarize the nesting colonies observed each season for the last six years, with comment on personnel involved in the search, and the area covered. In the data covering annual surveys, estimates are in round figures of thousands of nests.

Approximate Man Days Expended in Studies

County	1931	1932	1933	1934	1935	1936
Alameda (California)				2	2	1
Butte	3	3	4	2	2	2
Calaveras					1	
Colusa	3	3	3	2	2	1
Contra Costa		1				
Eldorado		1	1	1		

County	1931	1932	1933	1934	1935	1936
Fresno		1	1	1	1	2
Glenn	3	6	10	45	2	2
Kern		3	1	1	2	4
Kings		1	1	1		1
Lake						1
Lassen	1					
Los Angeles		2	1	1	1	2
Madera		1	1	1	1	2
Merced		1	30	3	5	4
Modoc	2	1	1			
Monterey		2	1	3	3	2
Napa		1				1
Orange		1	1	1	1	2
Placer		1	1	1	1	2
Riverside			1	1		15
Sacramento	3	5	3	3	2	5
San Benito			1	1	3	2
San Bernardino						2
San Diego		4	2	1	2	3
San Joaquin		2	2	2	3	2
San Luis Obispo		1	1	10	3	2
Santa Barbara		1	1	10	3	2
Santa Clara		1	1	1	4	2
Santa Cruz		2	1	1	3	1
Shasta	1	3	2			1
Siskiyou	2		1			
Solano		1				1
Stanislaus		5	1	1	5	2
Sutter	3	2	2	1	1	1
Tehama	2	3	2			1
Tulare		1	1	1	1	1
Ventura				1	1	1
Yolo	60	3	3	2	2	2
Yuba	60	60	60	60	60	2
Jackson (Oregon)	2		3			
Klamath (Oregon)	5		4			

In the table of man days in the surveys, the data are approximate and are designed merely to give some idea of the time expended. In most instances the entire time indicated was not spent directly in search for colonies. Entries of "one day" often mean merely driving through a county in routine business; entries of from 5 to 60 days do not mean that all this period was expended in direct search for colonies. Indeed the only definite and specific searches for colonies are included in the entries of two, three, and four days.

The table of approximate man days clearly emphasizes that only a partial coverage of the range of the species has been attained.

1931

Date	Locality	County	Habitat		Estimated number of nests
			General	Specific	
May 31	5 mi. E Woodland	Yolo	Reservoir	Cattails	4,000
May 31	5 mi. E Woodland	Yolo	Canal	Cattails	3,000
May 31	5 mi. E Woodland	Yolo	Marsh	Cattails	3,000
April 12	12 mi. NE Marysville	Yuba	Slough	Cattails, tules	3,000
April 15	2 mi. W Hammonton	Yuba	Dredger pits	Cattails	10,000
April 23	12 mi. NE Marysville	Yuba	Slough	Cattails, tules	30,000
April 24	10 mi. NE Marysville	Yuba	Slough	Cattails, tules	10,000
May 4	12 mi. NE Marysville	Yuba	Slough	Willows, cattails, tules	50,000
May 26	9 mi. NE Marysville	Yuba	Canal	Cattails	2,000
June 1	1 mi. NW Hallwood	Yuba	Slough	Cattails, tules	3,000
June 17	8 mi. NE Marysville	Yuba	Slough	Cattails	3,000
June 20	14 mi. NE Marysville	Yuba	Dry Creek	Cattails, willows	2,000

Field work in the nesting season of 1931 centered in the Hallwood and Cordua Irrigation districts northeast of Marysville, Yuba County, and on the Conoway Ranch, Yolo County. Trips were made to others of the seven rice-growing counties, and, in the nesting period, birds were noted in colonies in Butte, Sutter, Colusa, and Glenn counties, but no effort was made to estimate populations.

On May 30 and 31, 1931, Dr. Storer and a group from the Museum of Vertebrate Zoology visited Glenn County; two colonies were found near Glenn and a third near Princeton. A total of 2150 nestlings was banded in the three colonies. Later, information was received as to the location of a colony in Sacramento County, but no inspection was made until the next season.

1932

Date	Locality	County	Habitat		Estimated number of nests
			General	Specific	
May 10	10 mi. W Biggs	Butte	Canal	Cattails	75
May 10	10 mi. W Biggs	Butte	Slough	Cattails	500
May 10	8 mi. W Biggs	Butte	Marsh	Cattails	200
May 10	4 mi. N Biggs	Butte	Marsh	Cattails	2,500
May 15	NE Butte City	Butte	Marsh, slough	Cattails	5,000 (3 localities)
June 17	10 mi. W Gridley	Butte	Marsh	Cattails	300
June 17	9 mi. W Gridley	Butte	Marsh	Cattails	2,000
June 17	4 mi. W Biggs	Butte	Marsh	Cattails	3,000
June 17	3 mi. N Biggs	Butte	Marsh	Cattails	1,000
June 17	E Butte City	Butte	Marsh, slough	Cattails	9,000 (4 localities)
June 17	E Butte City	Butte	Marsh, slough	Cattails	4,500 (3 localities)
June 24	NE Butte City	Butte	Marsh, slough	Cattails	100
June 24	NE Butte City	Butte	Marsh, slough	Cattails	500
May 12	SW Princeton	Colusa	Slough	Cattails	5,000
May 12	5 mi. NE Maxwell	Colusa	Slough	Cattails	75
May 12	5 mi. NE Maxwell	Colusa	Slough	Cattails	1,000
May 12	4 mi. NE Williams	Colusa	Marsh	Cattails	20,000
June 13	5 mi. SW Grimes	Colusa	Slough	Cattails	250
June 13	9 mi. SW Colusa	Colusa	Marsh	Cattails	750
June 20	3 mi. SW Maxwell	Colusa	Marsh	Cattails	1,000
June 20	2 mi. SW Maxwell	Colusa	Canal	Cattails	200
June 20	1 mi. W Maxwell	Colusa	Marsh	Cattails	500
June 23	4 mi. E Delevan	Colusa	Canal	Cattails	2,500
June 24	15 mi. W Biggs	Colusa	Marsh	Cattails	400
May 10	8 mi.SE Willows	Glenn	Marsh	Cattails	15,000
May 10	5 mi. E Butte City	Glenn	Slough	Cattails, tules	5,000
May 11	6 mi. SE Willows	Glenn		Willows	3,000
May 11	2 mi. W Sidds Landing	Glenn	Ditch	Cattails, tules	5,000
May 11	3 mi. S Fairview School	Glenn	Marsh	Cattails, tules	3,000
May 11	2 mi. E Fairview School	Glenn	Marsh	Cattails, tules	1,000
May 12	4 mi. E Norman	Glenn	Marsh	Cattails, tules	15,000
May 21	1 mi. S Fairview School	Glenn	Slough	Cattails, tules, sedges	8,000
June 21	3 mi. SE Fairview School	Glenn	Marsh	Cattails	1,000
June 21	3 mi. E Fairview School	Glenn	Marsh	Cattails	2,500
June 24	7 mi. NE Butte City	Glenn	Marsh	Cattails, tules	5,000
June 24	9 mi. NE Butte City	Glenn	Marsh	Cattails, tules	5,000
May 16	4 mi SW Corcoran	Kings	Canal	Tules	2,000
May 14	15 mi. NW Merced	Merced		Thistles	50,000
May 4	4½ mi. NW Salinas	Monterey	Slough	Cattails, tules	750
May 4	San Juan Grade	Monterey	Marsh	Cattails	400
May 21	3½ mi. NE Castroville	Monterey	Slough	Tules	3,000

Date	Locality	County	Habitat		Estimated number of nests
			General	Specific	
April 25	18 mi. E Sacramento	Sacramento	Reservoir	Cattails, tules	120,000
May 5	Near Folsom	Sacramento	Reservoir	Cattails	1,000
May 18	Lakeside Lake	San Diego	Lake	Tules	200
May 19	1 mi. W San Luis Rey	San Diego	Lake	Tules	1,000
May 27	San Dieguito Reservoir	San Diego	Reservoir	Tules, cattails	200
May 27	2 mi. NE San Luis Rey	San Diego	Estuary	Tules, cattails	1,200
April 30	5 mi. W Watsonville	Santa Cruz	Dry Marsh	Blackberries, nettles, cattails	500
May 16	½ mi. S Anderson	Shasta	Marsh	Cattails, tules, sedges	10,000
May 18	5 mi. SE Anderson	Shasta	Creek	Cattails, tules	5,000
May 18	5 mi. NE Cottonwood	Shasta	Marsh	Cattails, tules	2,000
June 14	6 mi. S Redding	Shasta	Marsh	Cattails, tules	1,000
May 6	2 mi. W Birds Landing	Solano	Marsh	Cattails	6
May 14	3 mi. E Patterson	Stanislaus	Ditch	Tules	2,500
May 14	Near preceding colony	Stanislaus	Ditch	Cattails, tules	10,000
May 5	20 mi. N Sacramento	Sutter	Marsh	Cattails, tules, thistles	5,000
May 21	5 mi. N Robbins	Sutter	Marsh	Cattails, tules	5,000
April 9	Northern County Line	Yolo	Canal	Cattails	5,000
May 21	6 mi. W Sacramento	Yolo	Levee	Thistles, mustard	5,000
May 24	Near Davis	Yolo	Field	Thistles	28,000
May 20	12 mi. NE Marysville	Yuba	Marsh	Cattails, tules	100
June 6	15 mi. S Marysville	Yuba	Marsh	Cattails, tules	2,000

This was the season when the attempt was made to cover the entire range of the species. The writer surveyed in rather detailed manner the valley from Sacramento north to Redding and east to Glenburn and McArthur; W. P. Taylor, A. H. Miller, W. C. Jacobsen, A. E. Morrison, H. A. Crane, R. B. MacMath, B. F. Stroup, C. E. Berry, W. G. Duncan, and others, assisted in parts of this large area. T. I. Storer investigated a colony near Davis.

Jacobsen, C. Olsen, and H. A. Hunt studied colonies in Monterey County. Jacobsen and Ira N. Gabrielson noted several colonies in the San Joaquin Valley counties, and in San Diego County visited other colonies found by S. E. Piper and J. C. LaForce. Piper also discovered a colony in Santa Cruz County.

Reference to the table of estimated man days spent in the survey clearly indicates the incompleteness of the survey, and it must be emphasized here that only two areas were surveyed in any detail: San Diego County, and the area from Sacramento and Davis to Redding. Even in these regions it was impossible to make a complete survey of all possible localities. Many of the colonies outside these two areas were discovered as our cooperators drove up or down State in the performance of routine duties.

Besides the colonies listed, bands of adult Tri-colors were noted at many points in the height of the breeding season, on occasions when it was not possible to search out the nesting sites. Piper found adult birds at Lake Hodges, at San Luis Rey Mission, in the dredger workings in the Otay River valley, and on the Santa Margarita Ranch, in San Diego County. He also noted several flying bands in the vicinity of Watsonville, Santa Cruz County, and in July, 1932, observed immature birds in the Buena Vista Lake basin, Kern County, and near Los Banos, Merced County. In none of these instances were nesting sites found.

In the Sacramento Valley, flying or feeding bands were seen at various points where no breeding colonies were noted. Of chief interest was a group of adults feeding in a field near Glenburn, eastern Shasta County. It is estimated that unattached bands observed during the field work totaled considerably more than 50,000 birds.

1933

Date	Locality	County	Habitat		Estimated number of nests
			General	Specific	
May 10	West of Gridley	Butte	Marsh	Cattails	2,500
May 18	Near Shippee Station	Butte	Reservoir	Cattails	50
May 18	6 mi. W Biggs	Butte	Ditch	Cattails	1,200
May 18	5 mi. N Biggs	Butte	Canal	Cattails	2,500
May 24	8 mi. N Oroville	Butte	Marsh	Cattails	200
May 20	NE Butte City	Butte and Glenn	Slough	Cattails, tules	150,000
April 28	Colusa Outing Club	Colusa	Marsh	Cattails	10,000
May 4	4 mi. S Maxwell	Colusa	Canal	Cattails	4,000
May 9	1 mi. SW Cortena	Colusa	Canal	Cattails	2,000
April 21	E of Willows	Glenn	Slough	Cattails	2,500
May 3	E of Willows	Glenn	Slough	Cattails, willows	500
May 4	6 mi. SE Willows	Glenn	Willows		5,000
May 10	2 mi. W Glenn	Glenn	Marsh	Cattails	1,500
May 10	5 mi. SW Glenn	Glenn	Marsh	Cattails	2,000
June 14	26 mi. N Klamath Falls	Klamath, Oregon	Levee	Nettles	50
April 23	8 mi. N Atwater	Merced	Marsh	Cattails	15,000
April 26	3 mi. SW Merced	Merced	Marsh	Cattails	100
April 27	N of Merced	Merced	Marsh	Cattails	250
April 27	Near Hoff Station	Merced	Marsh	Cattails	1,000
April 28	4 mi. SW Livingston	Merced	Marsh	Cattails	1,000
May 2	3 mi. NE Snelling	Merced	Slough	Cattails	2,500
May 2	2 mi. S Snelling	Merced	Marsh	Cattails	1,500
May 2	1 mi. E Snelling	Merced	Marsh	Cattails	500
May 4	2 mi. S Livingston	Merced	Slough	Cattails	4,000
May 4	8 mi. SW Livingston	Merced	Marsh	Cattails, willows	6,000
May 9	Near Merced	Merced	Canal	Cattails	2,500
May 10	Near Merced	Merced	Creek	Cattails	3,000
May 10	4 mi. NE Merced	Merced	Creek	Cattails, willows	5,000
May 12	15 mi. S Merced	Merced	Marsh	Cattails	7,500
May 12	Near El Nido	Merced	Reservoir	Cattails	300
May 19	SW Merced	Merced	Canal	Cattails	1,500
May 26	5 mi. NE Snelling	Merced	Creek	Willows	1,500
June 5	Near Delhi	Merced	Marsh	Cattails	2,000
June 5	4 mi. S Turlock	Merced	Marsh	Cattails	3,000
May 26	Lincoln	Placer	Canal	Cattails	1,000
May 28	Near Folsom	Sacramento	Marsh	Cattails	1,000
June 3	18 mi. E Sacramento	Sacramento	Reservoir	Cattails, tules	100,000
May 22	Near Glenburn	Shasta	Riverbank	Roses, wild plums, blackberries	100
June 30	SE Anderson	Shasta	Creek	Cattails	1,000
May 19	Near Meridian	Sutter	Lake	Cattails	500
May 19	N of Robbins	Sutter	Marsh	Cattails	5,000
May 26	20 mi. N Sacramento	Sutter	Marsh	Cattails	7,500
June 1	6 mi. SW Sacramento	Yolo	Marsh	Cattails	3,000
April 28	12 mi. NE Marysville	Yuba	Slough	Cattails, tules	2,500
May 4	12 mi. NE Marysville	Yuba	Marsh	Cattails	5,000

In 1933 there was no attempt at a statewide search. Piper casually noted the presence of the birds in San Diego County. M. R. Gross, temporarily employed as an assistant, in cooperation with Piper, made a survey of Merced County, east of the San Joaquin River. The writer spent about two weeks in the Sacramento Valley area from Sacramento north to Redding and east to McArthur. MacMath covered Yuba, Sutter, and parts of Butte and Colusa counties. Other surveys were made only in Klamath County, Oregon, and in parts of Jackson County, Oregon.

The first nesting colony in Oregon was found (Neff, 1933, p. 234), and the first nesting records east of the Sierran summit in northeastern California also were made (Neff, 1934, p. 42).

Flocks of Tri-colors were seen in a number of places where no nesting site was observed. Small groups were noted in two places near Klamath Falls, Oregon, on June 14 and 16, 1933. Other bands were seen in the vicinity of McArthur and Glenburn,

Shasta County, California, on May 23; these were not trailed to their nesting grounds. Other small flocks were noted near Anderson in the same county.

In the vicinity of Richvale, Butte County, large numbers of the birds were seen flying northeastward from the village; no nesting site was discovered. Flying bands of Tri-colors were noted in the height of the nesting season at several points along the western edge of the Sierran foothills. There is no doubt that if time had permitted, a few colonies could have been found in the foothill districts of Eldorado, Amador, Calaveras, Tuolumne, and Mariposa counties. C. W. Feltes, of Modesto, reports in a letter dated March 24, 1936, that he observed a colony near La Grange, on land owned by the La Grange Gold Dredging Company; the location was in tules growing in a dredger cut.

John Cushing, of San Francisco, wrote under date of October 21, 1936, that on May 14, 1933, he found a breeding colony of Tri-colors at the mouth of White Gulch, Tomales Point, Marin County: "the parents were quite tame and the females sat in anxious groups at one end of the thicket while I searched the other."

1934

Date	Locality	County	Habitat		Estimated number of nests
			General	Specific	
May 23	Butte Creek	Butte	Sloughs	Cattails	4,000
May 23	SW Richvale	Butte	Canal	Cattails	6,000
May 23	SW Richvale	Butte	Slough	Cattails	20,000
May 23	4 mi. N Biggs	Butte	Marsh	Cattails	300
May 23	2 mi. N Biggs	Butte	Marsh	Cattails	1,000
May 23	1 mi. N Biggs	Butte	Marsh	Cattails	1,000
June 6	5 mi. W Colusa	Colusa	Marsh	Cattails	15,000
June 6	5 mi. W Colusa	Colusa	Marsh	Cattails	7,500
June 6	3 mi. SE Maxwell	Colusa	Marsh	Cattails	7,500
June 6	7 mi. NE Maxwell	Colusa	Slough	Cattails	7,500
April 25	2 mi. S Willows	Glenn	Ditch	Cattails	250
April 25	3 mi. SE Willows	Glenn	Canal	Cattails	2,000
May 9	8 mi. NE Butte City	Glenn	Slough	Cattails	6,000
May 9	8 mi. NE Butte City	Glenn	Marsh	Cattails	2,500
May 10	3 mi. S Willows	Glenn	Ditch	Cattails	1,000
May 10	1 mi. W Norman	Glenn	Marsh	Cattails	1,000
May 10	1 mi. E Norman	Glenn	Canal	Cattails	1,000
May 10	4 mi. E Norman	Glenn	Marsh	Cattails, tules	200,000
May 10	6 mi. SE Willows	Glenn	Marsh	Cattails	750
May 10	6 mi. SE Willows	Glenn	Marsh	Cattails	500
May 10	6 mi. SE Willows	Glenn	Marsh	Cattails	1,000
May 15	3 mi. W Glenn	Glenn	Marsh	Cattails	2,500
May 16	2 mi. E Norman	Glenn	Canal	Cattails	500
May 16	4 mi. SE Willows	Glenn	Slough	Cattails	30,000
May 16	8 mi. NE Norman	Glenn	Canal	Cattails	750
May 21	4 mi. E Willows	Glenn	Sloughs	Cattails, willows	200
May 21	7 mi. SE Willows	Glenn	Slough	Cattails	1,500
May 22	4 mi. NW Princeton	Glenn	Marsh	Cattails, tules	3,000
May 22	2 mi. NW Princeton	Glenn	Sloughs	Cattails, tules	400
May 22	2 mi. NW Princeton	Glenn	Sloughs	Cattails, tules	7,500
May 30	3 mi. NE Norman	Glenn	Creek	Cattails	750
June 1	3 mi. NW Princeton	Glenn	Canal	Cattails	600
June 1	8 mi. NE Norman	Glenn	Canal	Cattails	1,250
June 2	3 mi. S Willows	Glenn	Marsh	Cattails	1,000
June 4	3 mi. SW Willows	Glenn	Marsh	Cattails	10,000
June 5	4 mi. SW Willows	Glenn	Marsh	Cattails	5,000
June 5	2 mi. E Norman	Glenn	Creek	Cattails	1,000
June 11	Merced	Merced	Canal	Cattails	1,000
June 12	Near El Nido	Merced	Reservoir	Cattails	500
May 10	17 mi. E Sacramento	Sacramento	Reservoir	Cattails	75,000
May 15	18 mi. N Sacramento	Sacramento	Marsh	Cattails	5,000
May 24	Near Meridian	Sutter	Lake	Cattails, tules	2,500
May 24	N of Sutter Causeway	Sutter	Marsh	Cattails	3,500
June 4	6 mi. W Sacramento	Yolo	Marsh	Cattails	2,000
May 1	10 mi. S Marysville	Yuba	Marsh	Cattails	35,000
May 15	2 mi. W Hammonton	Yuba	Pits	Cattails	15,000

The season of 1934 was a busy one, and the only survey was made by the writer. The area covered was the seven-county Sacramento Valley rice district; the Glenn County rice area, comprising about one-fourth of the County, was surveyed in greatest detail. On July 11, 1934, a large population of birds was observed near the lake in Los Osis Valley, a few miles southwest of San Luis Obispo. Great numbers of young birds were scattered among the feeding flocks, but apparently all had left the nesting area in the heavy tules surrounding the lake, for no flight was noted into them. No estimate was made of the size of the band, but the age of many of the youngsters made it certain that they were hatched in this place and could not have flown in from any other known marsh.

The presence of the birds in several San Joaquin Valley counties, and in San Diego County, was noted, but time did not permit close inspection and the making of estimates. Feltes reported that the dredger cut near La Grange was again occupied by Tri-colors in 1934.

1935

Date	Locality	County	Habitat		Estimated number of nests
			General	Specific	
May 21	E Butte City	Butte	Slough	Cattails	500
May 21	SE Richvale	Butte	Slough	Cattails	1,000
May 21	E Riceton Station	Butte	Marsh	Cattails	250
May 21	SW Richvale	Butte	Marsh	Cattails	1,000
May 22	E Willows	Glenn	Slough	Cattails	1,000
May 22	SW Glenn	Glenn	Marsh	Cattails	2,500
May 22	W Glenn	Glenn	Marsh	Cattails	400
May 22	W Glenn	Glenn	Marsh	Cattails	200
April 30	Near Wasco	Kern	Reservoir	Cattails	1,500
April 25	S of Livingston	Merced	Canal	Cattails	150
May 27	4 mi. N Merced	Merced	Canal	Cattails	1,250
May 28	2 mi. S Snelling	Merced	Marsh	Cattails	5,000
May 28	1 mi. S Snelling	Merced	Slough	Cattails	600
May 28	8 mi. N Atwater	Merced	Marsh	Cattails	1,000
May 28	Near Hoff Station	Merced	Marsh	Cattails	400
May 28	Near Merced	Merced	Canal	Cattails	1,500
May 28	Near El Nido	Merced	Reservoir	Cattails	1,000
May 28	Near Livingston	Merced	Canal	Cattails	1,000
May 28	Near Livingston	Merced	Slough	Cattails, willows	1,500
May 28	S of Livingston	Merced	Canal	Cattails	4,000
May 28	S of Livingston	Merced	Marsh	Cattails	3,000
May 28	S of Livingston	Merced	Marsh	Cattails	1,500
May 28	S of Livingston	Merced	Marsh	Cattails	5,000
May 28	NE Los Banos	Merced	Marsh	Cattails	2,500 (3 localities)
May 28	San Joaquin River bridge	Merced	Canal, river bank	Cattails, willows	7,500
May 26	Nimbus Ranch	Sacramento	Reservoir	Cattails	1,000
May 12	Near San Clemente	San Diego	Swamp	Cattails	100
May 17	Near Escalon	San Joaquin	Marsh	Cattails	150
May 15	W Mt. View School	Stanislaus	Marsh	Cattails	2,500
May 15	Near Jennings School	Stanislaus	Canal	Cattails	5,000
May 17	E Oakdale	Stanislaus	Slough	Cattails	250
May 20	W Crows Landing	Stanislaus	Canal	Cattails	750
May 20	Sutter Basin	Sutter	Canal	Cattails	500
May 20	Near Meridian	Sutter	Canal	Cattails	750
May 13	Near Pixley	Tulare	Marsh	Cattails	1,500
May 24	S Elkhorn	Yolo	Levee	Thistles	5,000
June 18	SW Verona	Yolo	Pothole	Cattails	5,000
May 20	NE Marysville	Yuba	Slough	Cattails, tules	2,000
May 21	S Marysville	Yuba	Slough	Cattails	3,000

All of the observations of 1935 were made by the writer, except those in Stanislaus County which were made by Gross. Little time was spent in the search. Parts of five days were spent in the Sacramento Valley rice fields, and two days in Merced County in actual search for colonies. Other colonies were found while I was driving through the State. On May 10, Tri-colors were noted along the Santa Clara River valley near Piru.

Particular attention was paid to the eastern part of Merced County in order to compare the situation there with that recorded by Gross in 1933. Many other bands of birds were observed flying in the area between the Los Banos-Gustine Highway and the San Joaquin River. In mid-July, once again, young birds just out of the nest were noted at the lake in Los Osis Valley near San Luis Obispo.

1936

Date	Locality	County	Habitat		Estimated number of nests
			General	Specific	
May 27	Near Biggs	Butte	Canal	Cattails	1,000
May 27	Near Butte City	Butte	Slough	Cattails	3,000
May 28	Near Williams	Colusa	Marsh	Cattails	3,000
May 28	Near Williams	Colusa	Marsh	Cattails	2,000
June 6	Near Firebaugh	Fresno	Canal	Cattails	100 (see notes)
May 27	Near Butte City	Glenn	Marsh	Cattails	1,000
May 27	Near Artois	Glenn	Creek	Willows	1,000
May 28	Near Willows	Glenn	Marsh	Cattails	2,500
May 6	Near Tupman	Kern	Slough	Cattails, tules	500
May 6	Connors Station	Kern	Slough	Cattails	50
May 29	Near Lakeport	Lake	Marsh	Cattails	50
May 17	1½ mi. E Kemp Station	Los Angeles	River jungles	Cattails, willows	500
June 5	Near Merced	Merced	Canal	Cattails	2,000
June 6	Near Dos Palos Junction	Merced	Riverbank jungles	Cattails, willows	1,000
June 6	Lucerne Ranch	Merced	Marsh	Cattails	2,000
June 7	Near Snelling	Merced	Slough	Cattails	2,000
June 7	Arundel Station	Merced	Marsh	Cattails	1,500
June 7	Near Merced	Merced	Canal	Cattails	1,000
May 20	Near Salinas	Monterey	Marsh	Cattails, tules	2,000
May 10	Near Laguna Beach	Orange	Swamp	Cattails	250
May 26	Near Lincoln	Placer	Canal	Cattails	1,500
May 31	Near Folsom	Sacramento	Reservoir	Cattails	3,000
May 31	Near White Rock Station	Sacramento	Reservoir	Cattails	5,000
May 31	Near Ney School	Sacramento	Reservoir	Cattails	7,500
May 15	Near San Pasqual	San Diego	Marsh	Cattails	1,000
May 16	East edge Chula Vista	San Diego	Reservoir	Cattails	750
May 17	Near San Luis Rey	San Diego	Reservoir	Cattails	500
June 3	Near Lodi	San Joaquin	Canal	Cattails	100
June 3	Near Tracy	San Joaquin	Sloughs	Cattails	750
June 3	E of Tracy	San Joaquin	Railway slough	Cattails, willows	2,500
June 3	S of Manteca	San Joaquin	Canal	Cattails	500
May 18	Near Los Alamos	Santa Barbara	Marsh	Cattails, tules	3,000
June 4	Near Oakdale	Stanislaus	Canal	Cattails	7,500
June 4	Near Oakdale	Stanislaus	Canal	Cattails	500
June 4	Near Oakdale	Stanislaus	Lake	Cattails	500
June 4	S Oakdale	Stanislaus	Canal	Cattails	200
June 4	Near Roberts Ferry	Stanislaus	Marsh	Cattails, willows	1,000
June 4	Near La Grange	Stanislaus	Dredger pits	Cattails	3,000
May 25	Near Verona	Sutter	Marsh	Cattails, tules	3,000
May 27	Near Orland	Tehama	Creek	Cattails	750
June 1	Near Woodland	Yolo	Canal	Cattails, tules	1,000
June 1	Near Woodland	Yolo	Marsh	Cattails	1,000
May	Composite of all areas	Yuba			5,000

During the nesting season of 1936 the writer and all coöperators were so occupied with other duties that the Tri-color survey was a by-product. It was not possible to make any nest counts in any of the areas; estimates are based solely on experience in other seasons. Field observations were largely by Jacobsen and Hunt, of the State Department of Agriculture, and by the writer, with many others recording observations in restricted areas.

In the table for 1936, the entry for Yuba County is a composite figure including a number of small colonies scattered over a wide area. Agricultural Inspector MacMath assisted the writer in this compilation. Likewise in the 1936 table, a 100-nest colony is reported near Firebaugh, in Fresno County. This was apparently merely a remnant of a much larger colony, the major part of which had already left the nests.

Roving bands of birds were noted in many localities where we were unable to find nesting sites. In some instances, during June, these feeding groups were composed largely of vociferous youngsters. On April 19, Jacobsen observed a small band of Tri-colors near Milpitas, Santa Clara County. Hunt observed scattered Tri-colors in Monterey County at several points in addition to the one colony actually found; these were seen near Prunedale on June 10, and near Moss Landing on June 12.

In San Luis Obispo County on June 11, Agricultural Commissioner Chalmers and Hunt found a few adult Tri-colors entering the tule border of Laguna Lake. On the same day a band of well over 1000 adults and young was observed in fields of the Waller-Franklin Seed Company just south of San Luis Obispo. On the same date occasional birds were observed by Hunt between Pismo and Arroyo Grande. Gross also saw a definite flight in the Arroyo Grande area, and noted a colony in Orange County.

On May 30, Hunt closely studied a group of about 35 Tri-colors feeding about a marshy swale four miles south of Murrietta, Riverside County. In San Diego County, the writer encountered roving Tri-colors near Lake Hodges and near San Dieguito reservoir on May 15, and near Vista on June 22.

In Fresno County, roving bands of adults were noted at several points on May 5 and on June 6 and 8. Several flocks were observed in western and northwestern Madera County on June 5. On June 8, several feeding bands were seen near Hanford, Kings County, and near the old Tulare Lake bed; on this date three roving groups were observed between Tulare and Earlimart.

Large numbers of roving and feeding flocks were noted in Kern County. On May 6, the writer estimated that 10,000 adult birds were feeding in the section between Connors Station and Buena Vista Reservoir. Other bands were observed occasionally in the Wasco area on both May 5 and June 8. On June 10, a group of about 30 adults and young was seen feeding in a pasture on the Matilija Ranch near Ojai, Ventura County. Gross reports a flying band at Ventura about July 9. On May 15, a flying band of Tri-colors was noted by the writer between Santa Ana and Costa Mesa, Orange County. Other feeding, or flying, flocks were observed by Jacobsen in Solano County in June.

John Cushing reported by letter that he observed Tri-colors at White Gulch, Marin County on the week end of April 11, 1936. Calvin Stevens of Le Grand, Merced County, late in May found a deserted thistle nesting-site of large size east of that place; the young had left the nests.

These widely scattered bands during the nesting season give proof of a distribution far more widespread than the actual nesting-site records show.

SAMPLE DESCRIPTIONS OF COLONIES

For the sake of brevity no more than general information on the colonies is entered in the tables. The writer has in his files, however, detailed data relative to all of the colonies listed in this report, with detailed localities and further notes on the activities of the birds. The following sample descriptions of some of the colonies illustrate variations shown by this species.

About twenty miles east of Sacramento a reservoir, on what is known as the Nimbus Ranch, owned by the Natomas Company, was dammed or dug, about 1912, as a source of water supply for gold dredgers. Cattail and tule growth developed about 1916, and since 1920 or 1921 blackbirds have inhabited the area in great numbers. Marsh growth in 1932 covered 30 to 40 acres. On March 4, 1932, the roosting population of this area, estimated at "nearly a half-million birds," fed over an area fully forty miles in diameter. By April 25, 1932, nesting was under way, and by May 1 many of the nests held full sets of eggs. In May, 1932, many trips were made to this marsh, and the estimate of several coöperators was placed at 100,000 nests. By June 1 most of the young were leaving the nests, and by June 10 many new nests were noted with fresh clutches of eggs. After close inspection of the area, the number of new nests in the marsh appeared close to 20,000. Again in 1933, this spot was densely inhabited. In a series of ten-foot squares stepped off in the cattails, the writer counted from sixteen to thirty-six nests, all occupied; the average was twenty-six. The total was placed at approximately 100,000 nests. By 1935, dredgers had so changed the terrain that only 2000 to 3000 birds returned to this place; the feeding area was too far away. In 1936 this locality was deserted; three smaller marshes a few miles away were densely occupied by a population totaling about 100,000.

On April 30, 1932, at a point five miles west of Watsonville, Piper found a colony of about 1000 Tri-colors nesting in a rather dry marshy area; there was no standing water, but there was a thick tangle of blackberry vines, nettles, and rather sparse cattails. Nests were uniformly in early stages of construction, with no eggs.

On May 14 and 15, 1932, Gabrielson and Jacobsen found a nesting colony in a patch of thistles on a small slough about fifteen miles northwest of Merced on the Crane Ranch road. The thistle patch was from 75 to 125 feet wide, forming an almost impenetrable jungle. Nests held eggs or young. These observers estimated that the birds numbered between 60,000 and 75,000 pairs.

On May 19, 1933, the writer discovered a huge flight of Tri-colors on the holdings of the Dodge Land Company and the Perriott Grant ranch which overlap the Glenn-Colusa county line northeast of Butte City. Here there are a number of sloughs which are not continuously filled with water; their width varies greatly, and it is virtually impossible to estimate the total area. On May 20, 1933, tens of thousands of birds were flying back and forth into the cattails and tules in these sloughs, carrying nesting materials. The birds were active over an area roughly four miles east and west by six miles north and south. The number of birds, apparently all nesting in the slough area, was so far beyond comprehension that after spending parts of three days here the writer gave up in despair with the thought that an estimate of 250,000 adults was ridiculously low. On July 18, 1933, another visit to the section disclosed a general area of about forty square miles centering around these sloughs which literally teemed with squalling young Tri-colors and adults hustling for food for the immense aggregation.

On May 10, 1934, a nesting colony was noted in marshes which extend from the Culver Ranch into the Cross Ranch, four miles east of Norman, Glenn County. About

two weeks later, after nesting was under way in the entire marsh, an irrigation company official, practiced in judging land areas, estimated that nesting covered virtually sixty acres. During the nesting period many nest counts were made on sample areas; all averaged close to one nest for each five square feet. Even at one to ten square feet, the nests in this marsh would number about 260,000. As the estimated number of nests listed in this report is 200,000, this permits sufficient allowance for any parts of the marsh not so heavily populated.

On May 19, 1932, Piper found a colony on the ranch of Douglas Whelan near Mission San Luis Rey, San Diego County, in a sheltered lake with a luxuriant tule margin on the south and east sides. He estimated that 2000 adult birds occupied the area, many of them busily engaged in carrying food to young.

NESTING ACTIVITIES

It is not the purpose of this article to go extensively into habits. Dawson (1921, p. 107) gives such a true and picturesque description of the general habits of nesting Tri-colored Red-wings that parts of it are quoted here.

> *Agelaius tricolor* is intensely gregarious, more so perhaps than any other American bird. Every major act of its life is performed in close association with its fellows. Not only does it roost, or ravage grain fields, or foregather for nesting, in hundreds and thousands, but the very day of its nesting is agreed upon in concert. In continuous procession the individuals of a colony repair to a field agreed upon in quest of building material; and when the babies are clamoring the loudest for food, the deploying foragers join their nearest fellows and return to the swamps by platoons and volleys, rather than as individuals.

Dawson's description of a large colony is especially accurate, and the writer has come well to appreciate his statement of the ease of underestimating the population of a colony which is described in the following words:

> A prosperous colony of Tri-colored Red-wings is an enormous affair. At the height of building activities it seems a perfect bedlam, and the composite roar can be heard a mile away. At the same time, one rather wonders at the mildness and restraint of the individual utterance. The flock noise at its worst suggests a colony of a thousand birds, whereas there are in reality tens of thousands—say thirty thousand birds in a typical citadel. . . Excited platoons and hurrying companies of birds sweep over the ground with rapid undulating flight, and lose themselves immediately in the all-devouring green.

The spontaneity of nest building has been observed on various occasions. It has sometimes been definitely known that no Tri-colors frequented a certain marsh for weeks. Suddenly—within a few hours—a horde of the birds arrives and deploys to feed; within four hours of arrival the entire band has been busily engaged in gathering nest material, and by the end of the second day eggs have been noted in the nests. Indeed, on several occasions the birds appear to have dallied along the way, and eggs were deposited in unfinished nests, and in a few instances upon the ground close to the marsh.

Tyler (1907, p. 177) and Dawson (*loc. cit.*) describe another trait that is commonly noted. In brief, in a small colony, all nests are of approximately the same age, and egg deposition starts in all nests within a two-day period. In a large colony, however, this is not always true. In one section of the marsh may be found fledglings, in another incubated eggs, and in another fresh-laid eggs. Sometimes these groups will be found in different sections of the marsh. In colonies of smaller area, however, the newer nests are more likely to be found in concentric rings about the original nesting site, the newest nests sometimes being found in weeds on the margins of the marsh, or, as Tyler found them, even on the bare ground at the margin.

In one or two instances the writer observed nesting birds in a colony over a period

of seventy-five days. In such a colony all stages of nesting could be found after about fifty days; the original nests were at that time deserted by the young, as were the second stage nests; yet in some sections of the marsh there were relatively fresh eggs, or nests just being built. Some of the late activity may be true second nesting; it may be nesting of late arrivals. The writer has the impression that colonies nesting early in the season may subsequently change their habitat, and some of them may nest again in different localities.

MORTALITY AND DESTRUCTION OF COLONIES

Of interest is the question of destruction of nesting sites and mortality of young. Heermann (1853*a*, p. 17) wrote of wolves and foxes eating young birds that fell out of the nests. Belding (1890, p. 122) wrote of a colony near Stockton where many of the young were dead. Evermann (1919, p. 3) found that skunks disturbed the nests. Mailliard (1914, p. 204) wrote of the Swainson Hawk feeding upon young birds.

The destruction of nesting habitats by man is of most importance. Reclamation and drainage have destroyed many favorable habitats. Areas in the vicinity of San Francisco and Los Angeles are now so highly developed that it is doubtful whether or not any colonies could exist there. Other habitats have been destroyed by the dredging or cleaning of reservoirs, marshes, and canals in order to destroy the growths of cattails and tules.

In the present studies many instances of destruction of colonies have been observed. Certain localities have been drained; others have been burned out. In the Sacramento Valley area, burning of cattails in the winter and early spring does not deter the birds, if the marshes or canals are burned *before* the start of new growth. In one marsh the ground was absolutely bare on April 1, but on May 20 the cattails were six feet high and teeming with birds and nests.

The writer has noted a number of colonies which deserted full sets of eggs without apparent cause. In other places, which were unprotected, high winds caused such damage to the cattails and tules as to cause desertion. A large gopher snake was taken from the center of one marsh with a nestling in its jaws and two more already swallowed. In other instances snakes have been observed feeding upon young birds which had flown to the margins of the marsh. Many instances have been observed of nests pulled down or tipped over; the prevalence of raccoon, mink, and other predatory mammals in the rice-field district leads to the conclusion that they were the probable cause. Crows were observed eating eggs and destroying nests in one colony. Cooper Hawks fed upon the adults of one colony until it deserted the nests. About the mouth of a Burrowing Owl den in Colusa County were found the remains of twelve fully-feathered juvenal Tri-colors from a colony a few yards away.

It has been noted that there is heavier mortality in dense marshes late in the nesting season than early. Evidently the steamy heat of the marsh in mid-June and late June is so great that incubation begins with the deposition of the first egg. In a number of late colonies it has been possible easily to distinguish variation in size of the three or four nestlings, the largest being partly pin-feathered, while the smallest was apparantly freshly hatched. In such instances the youngest, and smallest, nestling is frequently found dead, from starvation or suffocation; usually only the larger two survive. Mortality seems to be heavier in larger, denser colonies after the weather becomes warm.

Gross (MS) reported a nesting site near Livingston, Merced County, which was deserted after a heavy windstorm. Another colony showed destruction of many nests. Trails led through the tules and near the entrance to the marsh he found tracks of a

dog or coyote. Of another colony he wrote: "For some reason a large majority of the young birds had died. Most of the nests contained only one young bird, occasionally two, and rarely three. A few dead nestlings were found in the nests and dozens were observed in the tules and on the ground on the outer edges of the marsh." Olsen and Hunt, in Monterey County, found a Boyle king snake feeding upon young Tri-colors.

ADAPTABILITY IN NESTING

Surprising adaptability has been noted in the choice of nesting sites. While the true marsh habitat with its rank growth of cattails and tules is strongly favored, the frequency of nesting in other cover, even where favorable cattail swamps are closely adjacent, strongly endorses the conclusion that marshes are not necessary for the continued nesting of the species; nor does this study lead to the conclusion that there has been any marked change in preference during the history of the species. Nesting is herein reported in the following situations:

Cattails and tules (most favored habitat).
On the ground.
Sedge grasses.
Marsh weeds.
Nettles.
Nettles and briars.
Willows.
Thistles.
Thistles and mustard.
Alder and willow bushes.
Foxtail grasses.
Raspberry bushes.
Rose, wild plum, and blackberry thicket.
Blackberry tangle, nettles, and sparse cattails.
Barley.
Grapevine and willow jungle.

ADVERSE FACTORS AFFECTING ABUNDANCE

Heermann wrote in 1853 of the large numbers of Tri-colored Red-wings shot for the market. This practice still continues, and during the past five years it is probable that fully 300,000 blackbirds of the combined red-winged group have been marketed from the Sacramento Valley, with no apparent change in the status of any of the kinds involved. During the winter season of 1935-36, 88,000 blackbirds were shipped from Biggs alone.

Current weather cycles have unquestionably played a part. The past twenty-year period has in general been one of dwindling rainfall and lessened water supplies. Many acres of previously irrigated land reverted to nature for lack of water. Marsh areas in these districts disappeared, although thistles, nettles, and other nesting habitats remained.

Destruction of the birds by man, of nesting sites through drainage or reclamation, of nests by predators or by the elements, and other factors, have played their part. All combined, however, they have made only fractional inroads on this species during the period covered by this report.

FAVORABLE FACTORS

Rice culture, extensive irrigation in many districts often without parallel drainage facilities, and the development of many acres of marsh habitat through irrigation water, have gone far toward furnishing these birds with favorable nesting locations, even in some districts which before irrigation were arid plains. Rice culture began in 1910 to 1912, and gave these birds a marked advantage not previously known.

Heavy rainfall in the season of 1934-35 did much to replenish the water supply in some of these areas, and resulted in a noticeable increase in the nesting of the Tri-colors. Continuation of annual precipitation in normal or more than normal amounts for a few more seasons will assist greatly in furnishing nesting sites in areas which have been dry.

DISCUSSION

The following hypothetical history of the species may well be true:

(1) There were available up to 1880, according to the most accurate topographic maps of the period, extensive nesting areas composed of thousands of acres of true marsh growth and large areas of dense riparian associations. Nesting area was almost limitless, but little is known of the actual density of occupancy. Probably the limiting factor was the available food supply.

(2) During the last years of the 19th century and the earlier years of the present century, marshes were drained and reclaimed, and riparian jungles were cut away. Agricultural development was rapid, with the earlier stages of irrigation. It seems probable that in some part of this period the species reached its lowest ebb.

(3) With the development of the last quarter century, even though rainfall was light, conditions undoubtedly changed for the better. Irrigation has been widely extended and inadequate drainage facilities in many areas have permitted the development of favorable palustrine habitat where before there were arid plains. Modern agriculture, with its new grain crops, has greatly increased the available food supply. The growing of rice, beginning in 1910, has furnished both a favored food and, through the necessity for extensive irrigation, a regrowth of marsh vegetation for nesting and roosting.

It is not unreasonable to assume that during the pioneer period in California the distribution of this species was regulated by the food supply. There was so large an area of favorable nesting that the birds were unable to increase past an optimum point because of scarcity of food. During the second period nesting sites became progressively more scarce, without any marked increase in the available food supply. The modern period has brought about a marked increase in the available food supply which has enabled this species to regain lost ground and to extend its range into areas which before did not favor its existence. It may well be more abundant today than it was in pioneer times.

SUMMARY

Published literature on the Tri-colored Red-wing does not substantiate the fears expressed in 1931 for the welfare of the species. The records then available were too sparse to provide a justifiable basis of opinion. Specific records of nesting colonies are noted in only twenty-six publications.

During the six-year period from 1931 to 1936, inclusive, colonies observed by the writer and coöperators have totaled an estimated 1,500,000 nests. In addition, there were several thousands of adults each season which were not traced to their nesting sites. Colonies have been observed in 26 counties in California, and the survey of the range is still incomplete.

The first positive nesting record of the species in Oregon and the first Oregon-collected skins of the species now known have been reported. The first nesting colony east of the Sierran summit in California (excepting the questionable record at Lake Tahoe) was observed near Glenburn, Shasta County.

Colonies have been studied ranging in number from a low of about six pairs in Solano County to a probable high of well over 200,000 pairs in Glenn County; another colony of like size, in Butte County, has been noted, and others of 100,000 or more in other counties.

Large areas of probable nesting range have not yet been surveyed. The outer limits of nesting range as shown in the present report indicate that breeding Tri-colors should be found at least occasionally in fifteen California counties from which there are at present no published records.

Published records indicated an altitudinal distribution of the species that ranged from approximately sea level to 1500 feet; the questionable Lake Tahoe record was at approximately 6225 feet. During the six years of work herein reported, the species has been found to range from sea level in San Diego and Santa Cruz counties to approximately 4000 feet elevation at Glenburn, Shasta County, and about 4200 feet on Klamath Lake. Occurrence at the higher elevations is probably erratic and intermittent, possibly because of paucity of favorable nesting sites at these elevations.

In 1915 the San Joaquin Valley was called the metropolis of the species. While this probably was true at the time, it must be remembered that much less field work had been done in the great Sacramento Valley area than in the San Joaquin Valley. Reference to the distribution map (fig. 21) in this report shows Tri-color nesting places in eleven Sacramento Valley counties where there were no previous published records.

The chief result of these studies has been the demonstration of the extremely erratic nature of the species, both in winter and in summer. In one season nesting colonies have been found widely scattered over a large part of the State; in another there have been great concentrations in relatively restricted districts; in 1934, Glenn County might have been called the metropolis of the species. In 1933 and again in 1935 a large number of colonies was found in that part of Merced County east of the San Joaquin River. It seems possible that observations have not covered a sufficient part of the range in one nesting season to permit final conclusions as to the true status of the species.

There is no indication that the Tri-colored Red-wing is losing ground, even in the face of modern development; rather, the indications are that it is at least holding its own, and is probably on the upgrade. Unquestionably, certain areas have been altered so that no suitable nesting sites remain, but these areas constitute a small part of the entire nesting range.

The evidence produced during the period indicates that the Tri-colored Red-wing as a species is thriving, nesting in almost every county in which it nested forty to seventy years ago, in numbers nearly as great as ever known. Great adaptability in nesting has been shown, and marsh growth does not appear to be a positive necessity for survival over short periods of drought or change. There is a probability that the species is even now extending its range from a low point reached in the period of most restricted habitat, and that it may be found shortly in some areas now considered marginal.

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Bureau of Biological Survey, Sacramento, California, November 10, 1936.

THE PATAGIAL FAN IN THE TUBINARES

WITH ONE ILLUSTRATION

By ALLAN BROOKS

While collecting Tubinares in New Zealand in 1931-32 I dissected out the wing muscles of a number of species and was greatly interested in the structure of the patagial fan and especially in the presence of a bone until then unknown to me although I had cleaned the wing bones of a number of species in years gone by. On a subsequent visit to that region, as well as on other trips to both coasts of North America, much attention was given to the presence or absence of this bone, which I had called the "spreader-bone," in different genera.

Dr. Alexander Wetmore and Mr. R. A. Falla (of the War Memorial Museum of Auckland) were both acquainted with this bone when I talked with them of it; the former considered it only a specialized cartilage, however, and of no taxonomic value. When in England in the spring of 1935, I drew the attention of Mr. Gregory Mathews, who was working on this group, to this special feature of its wing structure. He took the matter up and his conclusions may be found in *British Birds* (vol. 29, 1935, p. 201) and in the *Ibis* (ser. 13, vol. 6, 1936, p. 831). That fine anatomist, Forbes, in the Report of the "Voyage of H. M. S. Challenger," 1882, had recognized and illustrated the

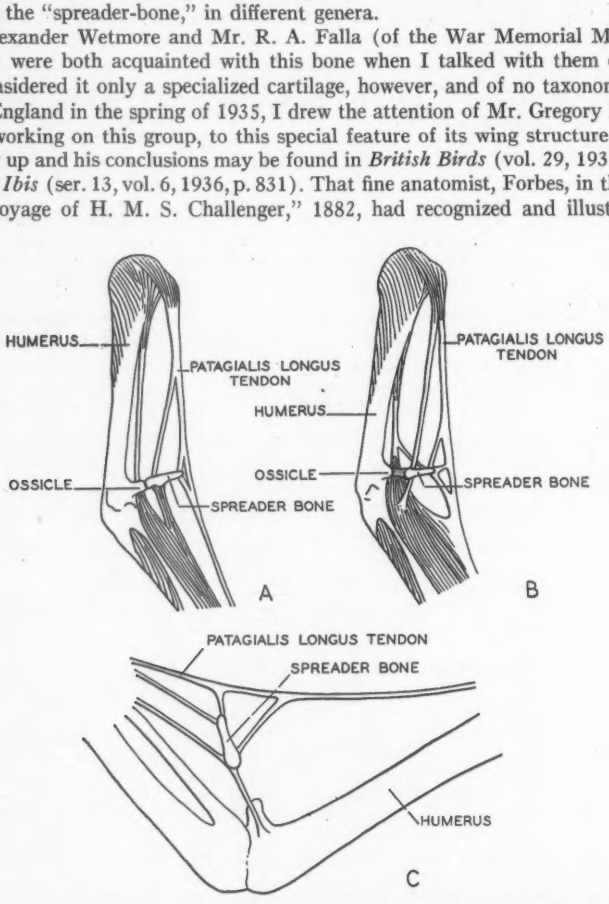

Fig. 22. A, right wing of *Puffinus bulleri;* B, right wing of *Pterodroma inexpectata* (stippled area is cartilage); C, left wing of *Diomedea nigripes.*

peculiarities in structure of the wings of the different genera of Tubinares without attaching much significance to the spreader bone. Meckel and Reinhardt had noticed it before that.

In my own investigations I found four different types of structure: 1, where the bone was pivoted on the ossicle at the distal end of the humerus, its extremity attached to the *patagialis longus* which extends from the shoulder to the wrist, as in all species of *Puffinus*; 2, where the spreader is attached to the *base* of the ossicle by a long tendon as in *Diomedea nigripes*; 3, where there is a wide flat cartilage connecting the spreader with the head of the ossicle as in *Pterodroma*; 4, where there is no trace of a spreader bone, ossicle present or absent. This last condition obtains in all the fulmars, storm-petrels, prions and in *Daption*. It will be seen that the presence or absence of the spreader-bone, called the "moklosteon" by Mathews, divides the Tubinares into two groups, the "gliders" where it is present, and the "flappers" where it is absent. I must say, however, that the fulmar in which it is absent does a great deal of gliding although not as much as the shearwaters. But the difference in flight between the Giant Fulmar (*Macronectes giganteus*) where the bone is absent and any of the albatrosses in all of which it is present is very noticeable.

In Forbes' beautiful diagrams *Pterodroma* is figured without the spreader bone. This is an error as I have found it present in three distinct types of that genus, *P. macroptera, P. cookii* and *P. inexpectata*.

The function of the spreader bone is obviously that of a strut, to support the strain of the long tendon, the *patagialis longus*, extending from the shoulder to the wrist. The effortless gliding flight of the albatrosses where the wings are rarely flapped must be greatly aided by the action of this bone. Many shearwaters are splendid gliders at all times, others like the Fluttering Shearwater (*Puffinus gavia*) beat their wings a great deal in a light breeze or a calm, but as soon as the wind hardens their whole flight alters; with rigid wings they swerve and swoop, now low over the water and at the next moment thirty feet or more above it in wild curves and pitches. The Black-vented and Manx shearwaters belong to this group.

The diagrams on page 82 were made from fresh specimens in the case of *Puffinus* and *Pterodroma*; in that of *Diomedea nigripes* from a partly cleaned wing (fig. 22). In *Diomedea exulans* and in *Thalassarche* the spreader bone is much longer than in *D. nigripes* and with a closer attachment to the ossicle.

Spreader bone present	Spreader bone absent
All albatrosses	*Macronectes*
Procellaria	*Fulmarus*
Puffinus including *Thyellodroma*	*Priocella*
Pterodroma	*Daption*
Bulweria	All storm-petrels (*Hydrobatidae*)
	Pachyptila (prions)
	Pelecanoides (diving-petrels)

Okanagan Landing, B. C., November 12, 1936.

THE SYSTEMATIC POSITION OF BUBO LEPTOSTEUS MARSH

WITH ONE ILLUSTRATION

By ALEXANDER WETMORE

While collecting in Eocene deposits at Grizzly Buttes, near Fort Bridger, Wyoming, in 1870, O. C. Marsh secured the distal end of the left tibia of an owl-like bird that he named *Bubo leptosteus* (Amer. Journ. Sci., ser. 3, vol. 2, 1871, p. 126). Under that name the species has been included in the A. O. U. Check-list of fossil birds, though Marsh in the original description indicated certain differences from *Bubo* that in his words "seem to imply a generic difference."

Shufeldt (Trans. Connecticut Acad. Arts Sci., vol. 19, 1915, pp. 33-34, pl. 2, fig. 18) made a careful comparison of Marsh's type with modern owls, with the final conclusion that "it came from the skeleton of some long extinct generalized form, with strigine affinities." His photograph is the only illustration of the specimen that heretofore has been published. In the fourth edition of the A. O. U. Check-list (1931, p. 462) the present writer listed this form in the genus *Bubo* with a footnote that indicated "generic allocation open to question".

Through the kindness of Dr. Richard S. Lull and Dr. M. R. Thorpe of the Peabody Museum of Yale University it has been my privilege to examine the type of *Bubo leptosteus* in an endeavor to establish more definitely its relationships. The result has been highly interesting.

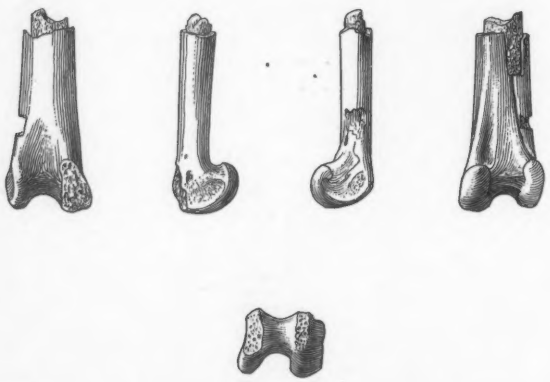

Fig. 23. Distal end of tibiotarsus, type of *Protostrix leptosteus* (Marsh); about natural size.

The type specimen (fig. 23), illustrated for me by Mr. Sydney Prentice, agrees with modern owls in lacking a supratendinal bridge. The intercondylar sulcus is broad and U-shaped, with the intercondylar fossa relatively small. The external condyle is reniform in external outline, with this external face irregularly concave. The amount of projection posteriorly beyond the line of the shaft is not certain as the bone is worn, but it appears to have been less than in modern owls. Anteriorly this condyle is narrow, much more so than in living Strigidae. The internal condyle has the posterior pro-

jection broken away. Anteriorly it extends as far as the companion condyle on the inner side; so much of the external face as remains is concave. Viewed from the distal end this internal condyle is thick and heavy, its lateral diameter being rather uniform throughout its length. The shaft is broad and flattened, tapering only slightly in transverse diameter toward the upper end. Posteriorly there is a slight concavity above the intercondylar sulcus. The external margin is somewhat narrowed, with no indication of the attachment of the fibula. The internal margin is broader, with the tubercle for the oblique ligament large but little elevated, so that it is distinguished only by close scrutiny of that part of the shaft. The anterior face of the shaft is somewhat excavated, but without the pronounced depression found in *Bubo*. The specimen (cat. no. 512, Peabody Museum, Yale University) is dull olive in color and is heavily fossilized. It measures as follows: Least transverse breadth of shaft 8.4 mm., transverse breadth across condyles 13.5 mm., anterior-posterior diameter of shaft 5.0 mm.

It is evident on even casual examination that the specimen differs from the Strigidae so decidedly that it should be removed from that family. Further, it is apparent that in its form *leptosteus* agrees with the Eocene genus *Protostrix* (Wetmore, Amer. Mus. Nov., No. 680, Dec. 4, 1933, p. 3) the type of which, *Protostrix lydekkeri* (Shufeldt), is also the distal end of the tibiotarsus. The resemblance to *Protostrix* is particularly close in the form of the condyles and of the intercondylar fossa.

From this it follows that Marsh's species must be removed to the family Protostrigidae where it will stand as *Protostrix leptosteus* (Marsh).

Compared with the drawings of *Protostrix lydekkeri*, the type of the genus, as illustrated in my published notes on that bird, *leptosteus* is appreciably smaller. In spite of this lesser size the intercondylar sulcus is equal in dimension in the two species, though both internal and external condyles are relatively narrower in *leptosteus*. While the two are quite distinct, it appears better, for the present at least, to place *leptosteus* in the genus *Protostrix* rather than to erect a new genus for it.

The genus will now be constituted as follows:

Protostrix lydekkeri (Shufeldt). Type.
Protostrix leptosteus (Marsh).
Protostrix saurodosis (Wetmore).

U. S. National Museum, Washington, D. C., September 12, 1936.

FROM FIELD AND STUDY

A Record of the White-winged Dove from Twenty-nine Palms, San Bernardino County, California.—In the *Condor* (vol. 3, 1901, p. 100) appeared an article by Edmund Heller, entitled, "Notes on some Little-known Birds of Southern California." Among his observations is the following, apparently made in May, 1896: "*Melopelia leucoptera*. White-winged Dove. While at Warren's Wells the miners told me of a white-winged dove which occurred at Twenty-nine Palms, a station some thirty miles farther east. From their description I judged it to be this species. If correct, future exploration should prove its presence, which would make an addition to the list of California birds."

Such "future exploration" came quite by chance. During the winter and spring of 1934, I was observing and banding birds in the oasis surrounding the Twenty-nine Palms Inn. Particularly successful was a four-celled Potter trap, placed on a small platform in an isolated mesquite at the edge of a grassy swamp. Mourning Doves had been plentiful for several weeks. On the morning of May 12, I noticed doves near the platform and replenished the supply of chick feed bait, in the hope of

Fig. 24. White-winged Dove, banded (no. A 444576) on May 12, 1934, at Twenty-nine Palms, San Bernardino County, California.

capturing a few. The bird which was found in the trap an hour later was not a Mourning Dove and with reference to Hoffmann's "Birds of the Pacific States" was readily identified as a White-winged Dove, *Melopelia asiatica trudeaui*. It was banded as no. A 444576, and the accompanying photograph (fig. 24) was taken without the slightest idea that it would verify a rumor of thirty-eight years' standing. No actual count was made, but the number of these doves present at that time might be estimated at six. Their calls were heard in striking contrast to those of the Mourning Doves, during the early mornings until my departure May 17. The following year there is a record only of their calls, heard May 10, 17 and 27, 1935.—FRANCES CARTER, *Berkeley, California, January 15, 1937.*

Long-tailed Chickadee in Arizona.—To my knowledge there are no reported specimens of the Long-tailed Chickadee (*Penthestes atricapillus septentrionalis*) from Arizona, although sight records have been recorded both from Grand Canyon National Park and San Francisco Peak, Coconino County. Records from the files of the Park Service supplied by Louis Schellbach are as follows: January 2, 1935, R. K. Grater observed two on a feeding board at the McKee residence, Grand Canyon Village; near the same locality, E. D. McKee saw a pair in yellow pines on July 1, 1927; and across the canyon on Walhalla Plateau of the North Rim, Grater saw three on June 21, 1935. In the San Francisco Mountains Jenks reports "parents feeding young" in the Hudsonian Zone (Grand Canyon National Park, Technical Bull. No. 5, p. 20).

The Long-tailed Chickadee probably is a fairly common fall visitant, at least locally, in the Tsegi Canyons, Navajo County, Arizona. Although Hargrave and Wetherill did not find this species in these canyons during the winter of 1934, the writer saw this bird almost daily in Betatakin Canyon from October 4 to 26, 1935. On the 23rd, ten were counted in one group feeding on cones of the Douglas fir. The Mountain Chickadee (*Penthestes gambeli gambeli*) is a common resident in the region, there being winter specimens in the Museum of Northern Arizona, as well as daily observations almost throughout the year. It is probable that many sight and sound records recorded under *Penthestes gambeli* should refer to *Penthestes atricapillus*, since *atricapillus* was identified as soon as its occurrence was considered probable.

Anderson (Condor, vol. 36, 1934, p. 78) made no mention of the Long-tailed Chickadee in Arizona, but its occurrence in the state is now attested by a specimen of an adult male found by the writer on October 23, 1936, in Betatakin Canyon. This specimen is number Z8.838 in the collection of the Museum of Northern Arizona, Flagstaff. The conspicuous buff of the sides and flanks distinguishes this specimen from *Penthestes sclateri* and identifies it definitely as *Penthestes atricapillus*. Upon geographic grounds it is considered to belong to the race *septentrionalis*. Identification has been checked by Hargrave, of the Museum of Northern Arizona.—MILTON A. WETHERILL, *Museum of Northern Arizona, Flagstaff, November 10, 1936.*

Cowbird Breeding in Solano County, California.—On June 9, 1936, along Green Valley Creek, Solano County, California, four miles northwest of Cordelia, I found a nest of the Lazuli Bunting (*Passerina amoena*) with two eggs of the owner and one egg of the California Cowbird (*Molothrus ater californicus*).

I believe this is the first record of the Cowbird breeding in this county. The Bunting's nest was four feet from the ground, fastened partly to twigs of a scrub oak and partly to a poison-oak bush on the bank of a swimming pool which had been formed by constructing a dam across the creek at that point. Incubation was advanced in all of the eggs.—EMERSON A. STONER, *Benicia, California, August 30, 1936.*

Desert and Lincoln Sparrows near Chico, California.—While watching several Gambel Sparrows feeding in my yard near Chico, California, in the morning of November 27, 1936, I saw a Desert Sparrow (*Amphispiza bilineata deserticola*) feeding with the flock. The sparrow was collected, and the skin is now in the study collection of the Chico State College. Sheldon in the Condor (vol. 11, 1909, p. 172) reported a Desert Sparrow from Kern County, which record is the only one I can find of its occurrence west of the Sierra Nevada.

During the months of November and December, 1936, a few Lincoln Sparrows (*Melospiza lincolnii lincolnii*) were occasionally observed in the flower gardens and shrubbery near my house. Several photographs were made of the Lincoln Sparrows on my feeding table during a snow storm in January, 1937. One of these sparrows was collected for the college study collection. There are breeding records of this sparrow for northern California, but I can find no reports of the species wintering in the Sacramento Valley—LLOYD G. INGLES, *Chico State College, Chico, California, January 12, 1937.*

Bird Records from Central-eastern Arizona.—The following notes from the White Mountains region of central-eastern Arizona represent part of the results obtained in a faunal survey undertaken under the auspices of the Arizona State Museum. The region being studied includes southern Apache and Navajo, eastern Gila, and northern Graham and Greenlee counties. Within this area, six life zones, ranging from Lower Sonoran to Hudsonian, are well represented. This paper lists species which are uncommon in that region, or in Arizona, and others whose abundance, as breeding birds or otherwise, has not been generally known.

The writers are indebted to Messrs. E. C. Jacot, H. H. Poor, F. G. Watson, A. R. Phillips, J. G. Correia and William Hudspeth for specimens and notes; to Mr. J. Grinnell for identification of specimens; to Mr. William Donner, Superintendent of the Fort Apache Indian Reservation, for granting us privileges within the Reservation; and to Superintendent Moore of the Apache National Forest and Mr. G. Becker for the use of facilities in furthering this survey.

The specimens mentioned in this report are in the Randolph Jenks collections of the Arizona State Museum and Museum of Vertebrate Zoology.

Casmerodius albus egretta. American Egret. One seen August 26, 1934, by Stevenson at Becker's Lake, two miles northwest of Springerville, Apache County, elevation 6850 feet. There are several reports of occurrence during spring and fall migration at lakes in central-eastern Arizona.

Egretta thula brewsteri. Brewster Snowy Egret. On October 4, 1934, Stevenson observed one flying over Becker's Lake.

Mycteria americana. Wood Ibis. One seen by Stevenson on August 29, 1934, in a marshy pasture near the city reservoir at St. Johns, Apache County. This species is rare in eastern Arizona.

Urubitinga anthracina anthracina. Mexican Black Hawk. On May 23, 1935, an adult female was collected by Jacot at its nest in the vicinity of Eagle Creek, south side of the Blue Mountains, Upper Sonoran zone, 5400 feet elevation. The nest of sticks, not yet completed, was located about 45 to 50 feet above ground in a sycamore. Another Mexican Black Hawk was present. On May 30, 1935, one was observed chasing a Treganza Heron in the air near the same locality.

Haliaeetus leucocephalus leucocephalus. Southern Bald Eagle. The species is a permanent resident in central-eastern Arizona, principally in the Transition and high Upper Sonoran zones. Many sight records have been made for every month of the year, and several nests have been discovered in trees along rivers within the White Mountains.

Eagles are occasionally caught in traps baited with meat. Ranchers report the presence and capture of birds in the autumn and winter months along Black River and its tributaries.

Catoptrophorus semipalmatus inornatus. Western Willet. An adult female was collected from a group of three at Becker's Lake, July 7, 1934, by Stevenson. On July 15, 1936, three were seen by Poor and Watson on the mud flats of Big Lake, 18 miles south of Springerville, elevation 9000 feet.

Totanus flavipes. Lesser Yellow-legs. The following represent the only known records for central-eastern Arizona. Two females were collected by Stevenson on September 7, 1934, from a pond just north of Springerville. Two were observed on the next day near the same locality.

Totanus melanoleucus. Greater Yellow-legs. Only two records for the region are available. On March 29, 1935, a male was collected by Jacot at a pond near Springerville. Seven were seen by Stevenson on August 26, 1934, at the same locality.

Pisobia bairdii. Baird Sandpiper. There is only one published record for the region. Henshaw (Rept. Geog. Surv. West 100th Merid., vol. 5, 1875, p. 456) states that adults and immatures of both sexes were collected by Newberry and him at Fort Apache, August 26-29, 1873. On September 2, 1934, a female was collected by Stevenson at Becker's Lake, two miles northwest of Springerville.

Lobipes lobatus. Northern Phalarope. Two were seen by Stevenson, one of which was collected, at a small pond in a gravel quarry, 1 mile northwest of Springerville, on September 25, 1934.

Sterna hirundo hirundo. Common Tern. On September 13, 1934, Stevenson collected a male at Becker's Lake.

Coccyzus americanus occidentalis. California Cuckoo. Rare in the high plateau region of Arizona, northeast of the Mogollon Divide. On July 14, 1934, we saw several in cottonwoods and willows along the Little Colorado River near Springerville. On July 20, Stevenson collected an adult male at this locality.

Otus asio cineraceus. Mexican Screech Owl. Only one specimen of this screech owl has been taken in central-eastern Arizona. On April 14, 1935, an adult male was collected by Jacot along the Coronado Trail, on the south side of the Blue Mountains. The bird was found in a locality where the vegetation was representative of both Upper Sonoran and Transition zones, elevation 6500 feet.

Otus flammeolus. Flammulated Screech Owl. Jacot observed a bird of this species on several dates between April 13 and May 16, 1935, in the Upper Sonoran and low Transition zones on the south side of the Blue Mountains, from 4900 to 6600 feet elevation. On May 16 he collected an adult at Eagle Creek, elevation 5500 feet.

Balanosphyra formicivora aculeata. Mearns Woodpecker. This woodpecker is a fairly common summer resident in the Transition and live oak belts. There are several autumn sight records for localities north of the Mogollon Rim, as at McNary, Lakeside, Showlow, and Springerville. Jacot found several in the vicinity of Alpine in March and November, 1935, and near Lakeside and McNary from January 21 to 31, 1936. There is one interesting record from the Canadian zone, where two were seen in Engelmann spruce forest on June 10, 1934, near Big Lake, 9100 feet elevation. One of these, an adult female with enlarged gonads, was collected.

Sphyrapicus varius nuchalis. Red-naped Sapsucker. The status of this species as determined by Swarth (Pac. Coast Avif. No. 10, 1914, p. 34) was: "A fairly common migrant," wintering in extreme southern Arizona and along the Colorado River. Swarth knew of no definite breeding records. The abundance of this sapsucker as a breeding bird of the mountains of central-eastern Arizona has generally been overlooked. Apparently there are no published records verifying the actual breeding of the bird in Arizona, although Huey (Wilson Bull., vol. 48, 1936, p. 123) found this species on the west side of the White Mountains in June and July, 1933, and states: "Three adult specimens in breeding condition were taken during our summer stay."

The Red-naped Sapsucker is a common summer resident throughout the Transition and Canadian zones, often ascending to within the Hudsonian zone. Many nests were found in June and July, 1934 and 1935. The nests were located from 10 to 25 feet above ground, generally in aspens along stream banks. A number of adult, immature and nestling birds were collected in 1934 and 1935.

During the last week of June, 1934, Mr. Perez Hayden and Stevenson observed a pair feeding noisy young in a nest in a living aspen on Buffalo Creek, a fork of Black River, Greenlee County, 30 miles south of Springerville. On June 29, we visited the nest at 8 p.m., at which time it was dark and the young birds were quiet. The nest was opened and a brooding adult and two young were collected. This adult, to our surprise, proved to be a male.

Dryobates pubescens leucurus. Batchelder Downy Woodpecker. This uncommon bird has been recorded as breeding sparingly in Arizona, only in the pine and spruce zones of the San Francisco and Mogollon mountains.

This species is probably more common in the White Mountains than in any other region in Arizona. Specimens have been collected in each season of the year. Most nests have been found in the Canadian Zone; a few in high Transition Zone. Several nests were discovered in the White Mountains, and one on Escudilla Mountain near the New Mexico line.

Corvus brachyrhynchos hesperis. Western Crow. Rather common summer resident of the meadows and open forests in the Transition and Canadian zones of the White Mountains. Young birds, just out of the nest, were seen June 30, 1934, at Brentwood Ranch, 27 miles south of Springerville, elevation 7750 feet. Other immature birds were noted June 18 with a small flock of adults near Big Lake, elevation 9100 feet. An adult male was collected by Stevenson on June 8, 1934, at the north base of Mount Ord, near White Mountain Reservoir. An immature male was collected by Jenks, August 11, 1935, in the Transition Zone, 28 miles south of Springerville, elevation 7600 feet. Flocks of 30 to 60 birds were often seen in autumn in the vicinity of Springerville, and were recorded on dates from August 25 to October 25, 1934. Phillips found crows on the high prairies of the White Mountains, Transition and Canadian zones, in the autumn of 1936, up to early November. Jacot recorded birds from the vicinity of Springerville in late February, 1935, and in March, 1935, near Alpine.

Sitta canadensis. Red-breasted Nuthatch. Fairly common summer resident, breeding in the Douglas fir and Engelmann spruce forests in the White Mountains. Numerous sight records were obtained in June, July, and August, 1934, 1935, and 1936. On July 27, 1935, an immature male was collected at an elevation of 8400 feet. A number of specimens were taken by Phillips and Correia in September, 1936, at the northeast base of Baldy Peak, where the species was noted up to late October. Has been found breeding only in the San Francisco, Mogollon, White and Santa Catalina mountains.

Oreoscoptes montanus. Sage Thrasher. On June 27, 1934, Stevenson collected an immature male on the sagebrush plains near Navajo, Apache County, elevation 6200 feet. This bird was ac-

companied by an adult. On July 5, 1936, Watson collected an adult male near Springerville. There are several autumn records from late August until late October from the vicinity of Springerville. Jacot found a single bird at Springerville, March 25, 1935, and found them "tolerably common" in the vicinity of San Carlos, February 27, 1936.

Myadestes townsendi. Townsend Solitaire. According to Swarth (*op. cit.*, p. 79), the species was known to breed in Arizona only in the Boreal Zone of the San Francisco Mountains. This bird is a common summer resident in the Canadian Zone, and parts of the Transition and Hudsonian zones of the White Mountains. Huey (*op. cit.*, p. 128) records several pairs found with young on the wing, July 1, 1933, on the western slope of these mountains. He also records several old nests found.

Fig. 25. Nest containing three young Townsend Solitaires, found June 11, 1934, 21 miles south of Springerville, Arizona.

We have collected a number of adult and juvenal birds in the summer months. On June 11, 1934, a nest containing three young was found under a log at Big Lake Knoll, 21 miles south of Springerville, elevation 9200 feet (see fig. 25). These birds were being fed by both parents. By June 14, the young had left the nest. Hudspeth found a nest with three eggs near Black River, August 6, 1936, elevation approximately 7700 feet.

There are numerous migration records from the vicinity of Springerville in September, October, and March, and from the Upper Sonoran Zone and south of the Mogollon Rim in April. Most of these observations list from three to twenty individuals seen at one time. Jacot found them at Springerville, Lakeside, Shumway and Showlow in January, 1936; and Phillips on the San Carlos Reservation in January, 1937. The Solitaire is a winter resident in the Upper Sonoran zone.

Cardellina rubrifrons. Red-faced Warbler. Not listed by Swarth (*op. cit.*) as occurring in the White Mountains although Henshaw (*op. cit.*, p. 212) records a few adults and young collected in the pine forest near Camp Apache in July, 1874. The White Mountains probably represent the northern limit of this warbler in extreme eastern Arizona. Several breeding birds, of both sexes, were collected in the summer months of 1934 and 1935. The species is a fairly common summer resident of the Transition and the lower edge of the Canadian zones in the White and Blue mountains. Records were obtained from altitudes as high as 9300 feet.

Pinicola enucleator montana. Rocky Mountain Pine Grosbeak. The only published record in Arizona is that of Vorhies (Condor, vol. 32, 1930, pp. 262-263), who observed six at Jacob Lake Ranger Station, altitude about 7500 feet, Kaibab Plateau, June 24, 1929.

From August 6 to 10, 1935, Jacot collected adults of both sexes and juvenal birds in the Canadian and Hudsonian zones at the northeast base of Baldy Peak, 9500 to 10,200 feet elevation. On August 14, 1935, Jenks collected two adult males and a juvenal from a flock of about 25 birds at the northwest base of Ord Peak, Canadian Zone, elevation 8200 feet. The birds were giving a melodious warble while alighting among the alders and willows at a hillside spring. On July 24, 1936, Poor collected a male at the northeast base of Baldy Peak, elevation 9500 feet. A number were seen and

several collected by Phillips from the same vicinity in the latter part of September and through October, 1936.

The above specimens represent the first to be taken in Arizona. Evidently the species is not an uncommon summer resident, and possibly a permanent resident, in certain localities on the higher peaks of the White Mountains.

Calamospiza melanocorys. Lark Bunting. Swarth's list (*op. cit.*, p. 61) mentions no records for this species in northern Arizona, north of the Mogollon Divide, but states that it should occur as a migrant.

On August 8, 1936, an adult male in breeding plumage and an immature male were collected by Watson in Upper Sonoran grasslands near Fort Apache, elevation 5300 feet. Migrant buntings were seen by Poor and Watson in the White River region up to the end of August, 1936. Flocks of as many as 100 birds were seen on the plains north of the White Mountains August 25 to 31, 1934, in the vicinity of Springerville and St. Johns, Apache County, and Holbrook, Navajo County. An adult male was collected August 28 at Springerville by Stevenson.—RANDOLPH JENKS, *Arizona State Museum, University of Arizona, Tucson, Arizona*, and JAMES O. STEVENSON, *Wildlife Division, National Park Service, Washington, D. C., November 24, 1936*.

Death Valley Bird Notes for 1936.—*Marila valisineria*. Canvas-back Duck. On October 31, two were seen on overflow ponds below Furnace Creek Ranch. They were quite tame, allowing me to approach as close as 20 yards without taking wing.

Himantopus mexicanus. Black-necked Stilt. September 2, five of these birds were seen in company of 11 Avocets.

Limosa fedoa. Marbled Godwit. August 27, a Marbled Godwit was seen with 5 Avocets on the ponds.

Sphyrapicus thyroideus. Williamson Sapsucker. On November 3, a woodpecker was seen flying from the direction of the floor of Death Valley and by watching the flight the bird was seen to alight among some mesquite trees in the lower part of Cow Creek a short distance above sea-level. A close approach showed the sapsucker at work on the bark.

Zonotrichia querula. Harris Sparrow. On November 10, a Harris Sparrow was seen at the Park Nursery at Cow Creek, which is situated above sea-level; but the bird was seen with two Gambel Sparrows flying from the direction of the below-sea-level area. The bird was seen near the nursery in company with the two Gambel Sparrows several times daily for six days and at times permitted close approach, allowing the distinguishing features to be clearly discerned.

Dendroica townsendi. Townsend Warbler. On September 29, one was seen at the Teck Springs Public Camp, about a mile northeast of Furnace Creek Ranch and 10 to 15 feet below sea-level.

Oporornis tolmiei. Tolmie Warbler. On May 24, one was seen at the same place where the Townsend Warbler was later seen. The location has many mesquite trees, making it ideal for migrating warblers.

The foregoing seven birds are new records for Death Valley. The following observations may be of general interest though the birds concerned have previously been reported from the Valley.

Agelaius phoeniceus nevadensis. Nevada Red-winged Blackbird. On June 1, a nest was found attached to leaves and stalks of the cat-tail growing in one of the ponds below the Ranch. In the nest were four blackbird eggs and one egg of the Dwarf Cowbird (*Molothrus ater obscurus*), all apparently somewhat incubated.

Anser albifrons. White-fronted Goose. On September 25, four were found dead on alkali flats near the "Devil's Corn Field." It was hot weather and they may have taken the white alkali flats for a body of water in the moonlit night.

July 18 and 19, several cases of what seemed to be heat prostration were observed among about sixty Tree Swallows (*Iridoprocne bicolor*) that appeared on an alfalfa field at Furnace Creek Ranch. The birds were feeding over the alfalfa, and after a short period of foraging they would fly to the shade of a row of trees along the field and alight on the ground, panting. Some of them died and others would allow themselves to be picked up in the hand. During August and September there were great flocks of ducks on the ponds, Pintails (*Dafila acuta*) predominating, with Cinnamon Teal (*Querquedula cyanoptera*) a close second. As many as 250 Pintails were observed at one time. A blind had been built near the bank of one of the ponds and one hot August day when I was about 30 yards from the blind a Pintail appeared in the doorway and looked at me curiously and then went back into the blind.

Birds not regularly seen in the Valley were as follows: Western Tanager (*Piranga ludoviciana*), July 3; five Clark Nutcrackers (*Nucifraga columbiana*), July 4; two Long-tailed Chats (*Icteria virens longicauda*) and one Arizona Hooded Oriole (*Icterus cucullatus nelsoni*), July 5; four Lewis

Woodpeckers (*Asyndesmus lewis*), September 25; one Black-headed Grosbeak (*Hedymeles melanocephalus*), October 1; a pair of Lazuli Buntings (*Passerina amoena*), August 20. On September 2 a visit to the ponds showed 100 Pintail ducks, five Black-necked Stilts (*Himantopus mexicanus*), 11 Avocets (*Recurvirostra americana*), one Osprey (*Pandion haliaëtus*), 4 Snowy Egrets (*Egretta thula*), 2 Great Blue Herons (*Ardea herodias*), 15 Black-crowned Night Herons (*Nycticorax nycticorax*), and one Northern and one Wilson Phalarope (*Lobipes lobatus* and *Steganopus tricolor*). September 13 the census at the ponds was: 40 Cinnamon Teal, 5 Pintails, 8 Great Blue Herons, 1 American Egret, 4 Shoveler Ducks (*Spatula clypeata*), 6 Snowy Egrets, 19 American Bitterns (*Botaurus lentiginosus*), 1 Night Heron, and 34 Avocets.—M. FRENCH GILMAN, *Death Valley, California, November 16, 1936.*

Further Additions to the Known Avifauna of St. Lawrence Island, Alaska.—In the past few months the United States National Museum has received from Paul Silook, an Eskimo collector on St. Lawrence Island, two small lots of birds comprising eight birds of seven species, six of which have not been hitherto reported from the island. All were collected by Silook, at or near Gambell, in the northwestern part of the island, in the summer (May to August) of 1936. The birds new to the island are as follows:

Oenanthe oenanthe oenanthe. European Wheatear. An adult, unsexed, collected in August.

Cyanosylvia suecica. Red-spotted Bluethroat. One taken in August. This essentially palearctic species occurs casually in Alaska, other localities there being St. Michael, Cape Blossom, Meade River, and Point Barrow.

Acanthopneuste borealis kennicotti. Kennicott Willow Warbler. Two specimens, one taken in July, the other in August, were sent in by Silook. Both are somewhat more greenish yellow below than either *kennicotti* or typical *borealis*, recalling in this respect *xanthodryas* Swinhoe of the Kurile Islands; but they have the outermost primary very short, not exceeding the greater outer upper primary coverts, thereby agreeing with *kennicotti* and *borealis*. These two forms are very slightly differentiated, the former being a trifle smaller than the latter. The present specimens have wings measuring 62.5 and 63 mm., respectively, and are in agreement with the type and a few other specimens of *kennicotti*, to which race they are identified.

Anthus spinoletta rubescens. American Pipit. One specimen, June.

Anthus cervinus. Red-throated Pipit. One, collected in July. It is in fresh winter plumage and lacks the reddish on the throat which is pale ochraceous buff streaked with blackish like the rest of the underparts. The date indicates that the winter plumage is acquired early.

Pyrrhula pyrrhula cassinii. Cassin Bullfinch. An unsexed bird, adult male by plumage, was taken in May, and forms the third record for the species in Alaska. The previous two records were, one at Nulato, January 10, 1867, and three specimens on Nunivak Island, October 12 to 16, 1927. Silook recognized it as a new bird in his experience as he wrote on the label, ". . . unusual kind and killed very first time. . ." A reëxamination of the relationships of the Alaskan Bullfinch fully corroborates Swarth's findings (Proc. Calif. Acad. Sci., ser. 4, vol. 16, 1928, pp. 248-250). The present specimen is *cassinii*, the form inhabiting Kamchatka (of which *Pyrrhula kamtschatica* Taczanowski is a synonym), and is very distinct from the Lake Baikal bird, *cineracea* Cabanis, which Hartert (Vög. pal. Fauna, vol. 1, 1903, p. 96) considered to be *cassinii*.—HERBERT FRIEDMANN, *U. S. National Museum, Washington, D. C., December 9, 1936.*

The Western Mockingbird in Oregon.—In August, 1935, while Mrs. Jewett and I were camped at the old P Ranch in the Blitzen Valley, Harney County, Oregon, one evening Mrs. Jewett came into the ranch house and casually remarked that she had seen a mockingbird about a mile south of the house, where the Blitzen River emerges through a narrow canyon as it leaves the Steens Mountains. Needless to say, I was surprised and, I admit, skeptical as well; for the mockingbird had not only never been recorded anywhere in Oregon, but its presence was not even suspected. The unexpected often happens to the ornithologist, however, as I was to learn later.

On November 21, 1935, while I was very busy with a large crew of CCC boys building a concrete dam in the Blitzen River, I saw a "grey and white" bird fly from off the hillside and light on the topmost twig of a dead alder tree on the river bank. I thought at the time that it was an odd-looking Northern Shrike, a common winter resident in this locality; but being absorbed in my construction job, I paid little attention to it.

While hiking in the Upper Blitzen Canyon in the Steens Mountains on February 9, 1936, where winter birds were scarce indeed, I flushed and collected an adult male Western Mockingbird (*Mimus polyglottos leucopterus*) in a scattered clump of junipers. It was then that I realized what bird I had seen on November 21, 1935, and that my wife was apparently correct when she reported one seen

during August of the same year. Another was seen near the same locality on March 26, 1936, and an immature one was collected about two miles east of Fish Lake, Steens Mountains, Harney County, at about 7500 altitude, on August 30, 1936.

From the above evidence it would seem that there is an isolated colony of resident mockingbirds on the west slope of the Steens Mountains in southeastern Oregon.—STANLEY G. JEWETT, *Burns, Oregon, October 27, 1936.*

The Red Phalarope in Texas.—There is a mounted specimen of the Red Phalarope (*Phalaropus fulicarius*) in the museum of the Panhandle-Plains Historical Society at Canyon, Texas. The bird, a female in winter plumage, was collected by L. E. Simms at a wet-weather lake six miles south of Canyon, Randall County, Texas, on October 12, 1933. The specimen is labelled "Wilson Phalarope," an obvious error in identification. Apparently this is the first occurrence of the species in Texas and the record is remarkable in that this bird was obtained on the high plains of the Texas Panhandle. There are few records of this species from the interior of the United States.

Mr. L. E. Simms of Canyon, Texas, has kindly granted me permission to publish this note.—JAMES O. STEVENSON, *Wildlife Division, National Park Service, Washington, D. C., October 24, 1936.*

A Nest of the Olive-sided Flycatcher.—Records of actual nests of the Olive-sided Flycatcher (*Nuttallornis mesoleucus*) in Arizona consist wholly, to my knowledge, of the nests found on July 1, 1931, by Jenks (Condor, vol. 36, 1934, p. 175) on the Kaibab Plateau. These were 40 to 70 feet up in spruce trees, which is the normal nesting habitat, according to various authorities. My experience this summer has been at such marked contrast as to be perhaps noteworthy.

Laboratories of the Museum of Northern Arizona are at Coyote Range, the estate of Dr. Harold S. Colton, 2½ miles northwest of Flagstaff (altitude 7100 feet). The region is typical yellow-pine forest (Transition Zone). A creek just below the Colton house supports a growth of willows and gooseberries, and the side of this little canyon is grown up to ferns, Gambel oak, and quaking aspen. Arrival of the Olive-sided Flycatcher was noted May 28, 1936, when one was heard just below the Colton house; possibly the same bird was heard and seen here May 30. Only one pair bred in the vicinity, and no definite migrants were seen all summer.

On June 6, on the canyon's edge just back of the Colton house, an Olive-sided Flycatcher was seen carrying a twig for its nest. On June 27, at the same spot, one was flushed from a nest 10 feet up in a small crotch against the trunk of a small Gambel oak. The tree was too slender to be climbed, so the contents were not seen until June 29, when with the aid of a tripod three eggs were counted; photographs were taken by Dr. Colton. Two of the eggs hatched between 1 p.m., June 30, and 12:15 p.m. July 1. At this time an eggshell was found on the ground below the nest; it showed signs of having been cut in half and was saved.

My absence prevented further observations until July 11, when at 5:15 p.m. three young were seen in the nest. Next noon, however, there were but two; the fate of the third is not known. The two remaining young were still in the nest, but appeared ready to leave, when I left on a trip at 4:45 p.m. July 16.

An adult was brooding June 27 (9:05 a. m.), 29 (2:30 p.m.), 30 (12 m.), and July 1 (12:15 p.m.). None was on the nest at 1 p.m., June 30, or after July 10. The nest, placed on the east side of the tree, was composed of twigs and yellow-pine needles, with a grass lining and rim decorations of mossy, green rootlets; it thus resembled Mr. Jenks' nests.

It seems likely that these birds built in such a situation because of unsuitability of the surrounding western yellow pines for nests of this type. This pine's bare branches, tipped with thick clusters of long needles, offer little support. If true, this theory would help to account for these birds' apparent preference of the Canadian Zone (Jenks, *loc. cit.*), where they may find at the same time suitable nesting trees and a certain amount of yellow-pine needles, which are favorite building materials. It would also show why they are so uncommon in pure yellow-pine regions, for nesting under such circumstances is hazardous. Indeed, I was constantly expecting the fragile nest to be blown down.—ALLAN R. PHILLIPS, *Museum of Northern Arizona, Flagstaff, September 24, 1936.*

NOTES AND NEWS

Notices of the Twelfth Annual Meeting of the Cooper Ornithological Club recently have been sent to members. The sessions for the presentation of papers will be held in the morning and afternoon of Friday and Saturday, April 16 and 17, in Life Sciences Building, University of California, Berkeley. Members who plan to contribute to the sessions are urged to send in titles by April 1 to Mr. William H. Behle, chairman of the local committee, so that their papers may appear on the printed program. Sunday, April 18, is to be devoted to field trips. One, or several, trips will be arranged in accordance with the wishes of those attending the meeting. The officers of the Board of Directors have issued a call for proxies to be used at the annual business meeting. It is exceedingly important that these proxy cards be returned in the event persons cannot attend, so that a quorum may be represented and the necessary business of the club be transacted.—A. H M.

Last year we pointed out in these columns that it was high time for someone to begin compiling the fourth ten-year index to the Condor, and we called for applicants for the job. We are happy now to announce that Mr. John McB. Robertson has offered himself, and been chosen by our editors, to undertake this service to the Club and to bird students generally. No one known to us is better qualified or better located to carry on the work to a successful conclusion. Mr. Robertson will doubtless elicit aid from other C. O. C. members, and we bespeak for him their wholehearted help.—J. G.

In the present issue of the Condor appears an extensive paper by Johnson A. Neff on the Tricolored Red-wing. This worthy study was longer than could justifiably be printed in this magazine under its regular budget. Through the efforts of the author, part of the expense of publication was contributed by persons who, for various reasons, have been especially interested in the problems connected with this species of blackbird.—A. H. M.

The Sacramento Migratory Waterfowl Refuge, formerly the Spalding Ranch, is south of Willows, Glenn County, and in the northern part of the Sacramento Valley. Its acquisition by the Biological Survey was announced early in 1937. The 10,775 acres are located especially well to contribute to refuge facilities for water birds in California. The press release contains the comment that "because the Sacramento Refuge is naturally attractive to waterfowl the Biological Survey plans little development work there. Marsh and hay lands used by the geese and ducks have a good supply of water. Small dams, dikes and levees will be constructed, however, to impound water from spring run-offs from higher areas. The ranch buildings will be remodeled for use in administering and maintaining the refuge."—J. M. L.

Fig. 26. J. R. Pemberton, life member of the Cooper Ornithological Club and member of its Board of Governors, whose field trips for collecting and photographing birds have led him to many places in western North America and southern South America.

One of the most important contributions to avian anatomy to appear in recent months is G. E. Hudson's "Studies on Muscles of the Pelvic Appendage in Birds" (Am. Midland Naturalist, vol. 18, 1937, pp. 1-108, 26 pls.). The legs of one or more representatives of eighteen orders of North American birds have been dissected. The principal descriptions and the excellent illustrations that include limb cross-sections, are based chiefly upon the crow and the raven. We have reason to believe, through related studies on the pelvic limb, that the accuracy of the observations is of high order. Several errors and omissions in Shufeldt's "Myology of the Raven" are rectified, so that Hudson's work becomes the most practical and authoritative general paper on leg muscles available. The foremost contribution of the study is the projection of Garrod's system of muscle formulas to cover additional muscles and to give further aid in the definition of major taxonomic groups. Anyone attempting to determine the relationships among families and orders of birds could ill afford to neglect the data

that are presented. There is an attempt to stabilize the nomenclature of muscles by adopting the BNA names in instances where homology with mammalian muscles has been claimed. In the problem of homology, Gadow's opinions, which need confirmation, are followed closely. Muscles not so homologized, bear names taken from Gadow's descriptive system. These names are sometimes awkward and unnatural, but the same is true to even greater degree of those of Shufeldt which, conveniently, are given in synonymy. The author wisely emphasizes that the exact diagnostic peculiarities of the musculature of larger taxonomic categories are yet to be determined. Dissection of a few samples of an order gives no picture of the constancy of myological characters within the group. Thus, although Hudson's synopses of characteristics of each order are valuable, they also should stimulate additional investigation.—A. H. M.

An article the reading of which proved exceptionally entertaining to our type of mind appeared in the Wilson Bulletin (vol. 48, 1936, pp. 203-215) under the title "The First Descriptions of North American Birds." In this article the writer, Prof. O. A. Stevens of North Dakota Agricultural College, tabulated the species described by each of the earlier authors and gave additional information of interest. Recently we took opportunity to check over the names of North American birds first launched by Linnaeus in the 10th (1758) and 12th (1766) editions of the Systema Naturae. We followed the references as given in the 4th edition (1931) of the A. O. U. Check-list and found that in the 10th edition of Linnaeus, 153 of the species on the A. O. U. list had been first named by him, and in the 12th, 51 additional species. These figures are close to those given by Stevens, the differences being accounted for in part by the fact that we counted in all the "accidentals" and "introductions." As pointed out by Stevens, Linnaeus had no first-hand information on exclusively American birds, having got what diagnostic materials he required from Catesby, Edwards, Brisson, and other non-binomial authors.—J. G.

Announcement on the back cover of this issue of the Condor, of temporary reduction in prices of Cooper Club publications, provides an opportunity to fill out sets which is not likely to be repeated. Persons who make field observations on birds in any of the districts covered in the Avifauna series can scarcely afford to be without the numbers which pertain to their areas. The chief interest in much of our bird watching comes through comparison of our findings with previous records from the same neighborhoods.—J. M. L.

The sad word comes of the death of Frederic H. Kennard, at his home in Newton Centre, Massachusetts, February 24, 1937. A member of the Cooper Ornithological Club since 1911, he has long been known to us as one of the most cheerfully helpful and sympathetic of our eastern representatives. He belonged to that potent group centered at the Museum of Comparative Zoology, which has been consistently productive of good ornithology and influential in guiding current thought.—J. G.

MINUTES OF COOPER CLUB MEETINGS

SOUTHERN DIVISION

NOVEMBER.—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held November 24, 1936, at the Los Angeles Museum, Exposition Park, with President Little in the chair, and 46 members and guests present. Minutes of the Southern Division for October were read and approved. Minutes of the Northern Division for September and October were read by title only. Proposals for membership were: Edward M. Hall, P. O. Box 84, Whittier, Calif., by Sidney B. Peyton; Kemuel Anderson, 949 S. Gramercy Place, Los Angeles, by Loye Miller; Hatch Graham, 10300 Viretta Lane, Los Angeles, by R. B. Cowles; Boyd McLeod, 145 S. Beachwood Drive, Los Angeles, by Mrs. J. Eugene Law.

The following proposal for Honorary Membership was read:

The unique and uninterrupted service of W. Lee Chambers for nearly forty years in the interest of the Cooper Ornithological Club is too well understood by the entire membership to need elaboration here. To state merely that this officer has throughout these long years stood silently, but smilingly, alone as a bulwark against which financial buffetings have broken in vain assaults on our publishing machinery, seems sufficient to warrant whatever expression of confidence and appreciation lies within our power to bestow. Lee Chambers has never wavered in his loyalty and devotion to western ornithology and to Cooper Club interests. A singularly sound and shrewd business judgment combined with a never-failing enthusiasm in furtherance of the publication of worthwhile manuscript material over the Club imprint has been of the most vital importance alike to the organization and to the Science. His own vicarious contributions to avian bibliography can be attested by all who have experienced his wide and diversified knowledge of the literature of birds, no less than by those who know of his energy and foresight in fostering the publication of this most important, though often neglected, class of material. His uniform courtesy and thoughtful kindnesses as host to countless visiting ornithologists have been no small factors in making Club sociability known far and wide for its warmth and sincerity.

In view, then, of his life of devotion to the organization and to western ornithology, Be It RESOLVED that the Secretary be instructed to cast a unanimous ballot for the election of W. Lee Chambers to Honorary Membership in the Cooper Ornithological Club, and, be it RESOLVED that Mr. Chambers be furnished with a copy of these resolutions.

Signed by Wright M. Pierce, Joseph Grinnell, Harry Harris, Louis B. Bishop, George Willett, Howard Robertson, Guy C. Rich, Loye Miller.

R. B. Cowles reported, on the sardine question, that the committee had decided, after investigation, that nothing should be done for the present. A letter from the State Fish and

Game Commission stating that no permits to discharge firearms from an airplane would be issued, was read. A letter from the curator of Ornithology at the Santa Barbara Museum, telling about the finding in the mountains northwest of Santa Barbara of two Condors that evidently had been killed by a heavy fall of hail, was also read. Mr. Sheffler told of his trip into the White Mountains of Arizona after Wild Turkeys, and the finding on October 20 of Band-tailed Pigeons nesting, with fresh eggs in the nests. Dr. Miller reported finding two dead Slender-billed Shearwaters dead on the beach.

Dr. Miller, the speaker of the evening, then told in his inimitable way, of his trip down the west coast, by boat, to Panama, through the canal and to Chiriquí Lagoon where most of his time was spent. Wyman Gulls followed the steamer part way down the coast of Lower California, and California Gulls were present from the southern part of the Lower California coast, part way down the Mexican coast, but from there till they reached the Gulf of Tehuantepec, all species of Gulls were absent. Laughing Gulls were then common in winter plumage, until after passing through the canal to the Caribbean side, where no gulls were to be seen. This was the latter part of February, and when he returned from Chiriquí Lagoon the first part of April Laughing Gulls in breeding plumage were common. Dr. Miller had brought a number of bird skins to illustrate his talk and their plumage was in the main part very dark, either black or brown, with brilliant reds and yellows for contrasts. After the meeting adjourned, these were examined with much interest.

Adjourned—SIDNEY B. PEYTON, *Secretary*.

DECEMBER.—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held at the Los Angeles Museum, Exposition Park, on Tuesday, December 29, 1936, at 8 p.m., with President Little in the chair and 55 members and guests present. Minutes of the Southern Division for November were read and approved. Minutes of the Northern Division were read by title only. The following names were proposed for membership: Joseph Ewan, 3000 Life Sciences Bldg., University of California, Berkeley, by Margaret W. Wythe; Oscar Owre, Jr., 2625 Newton Ave. So., Minneapolis, Minn., and Egmont Z. Rett, Museum of Natural History, Santa Barbara, Calif., by W. Lee Chambers; William Thomas Miller, 1809 Bushnell Ave., South Pasadena, Calif., by Harold Michener.

Following the second reading of the proposal for Honorary Membership of W. Lee Chambers, it was moved, seconded and carried, that he be declared unanimously elected. President Little appointed W. Lee Chambers, Dr. Loye Miller and Dr. Guy C. Rich to serve as a committee to nominate officers for the coming year.

President Little then introduced the speaker of the evening, M. Jean Delacour, the distinguished French Ornithologist who spoke on the ornithological exploration of Indo-China, where he had spent parts of several years in gathering a general collection of the birds that inhabit that country. Most of these specimens went to the American Museum in New York, the Field Museum in Chicago, the British Museum in London, and the Natural History Museum in Paris. Many of the birds collected were of species new to science; many were very rare and difficult to collect. Mr. Delacour had four of his volumes with him that were illustrated with colored plates of the birds that had been collected on these expeditions; these books were passed around for the members to examine.

Sidney Peyton told of the finding by Herman Keene, on December 1, of the mummified body of an adult California Condor in the "Squaw Flat" section of the Lower Sespe country. From the condition of the body it had evidently been killed by some deer hunter this past hunting season.

Adjourned.—SIDNEY B. PEYTON, *Secretary*.

NORTHERN DIVISION

NOVEMBER.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, November 19, 1936, at 8 p.m., in Room 2503 Life Sciences Building, Berkeley, with President Miller in the chair and about 90 members and guests present. Minutes of the Northern Division for October were read and approved. Minutes of the Southern Division were read by title only. Applications for membership were: Lovett Thomas Turner, Box 981, Emmett, Idaho, proposed by E. L. Sumner, Sr.; J. Duncan Graham, Box 27, Benicia, California, proposed by Emerson A. Stoner; William H. Marshall, Box 603, Brigham City, Utah, proposed by Seth B. Benson.

Miss Werner told of her observations of birds in Washington, D. C., during July and mentioned the work of Mr. Albert Brand in recording bird songs. E. L. Sumner, Sr., asked whether it was usual to find the Wilson Snipe in such a locality as a dry region of the Santa Cruz Mountains, at an elevation of 2000 feet, where a small pond provided the only suitable habitat. Mr. Moffitt described a similar occurrence of the species in Mendocino County, and Miss Carter in San Bernardino County. Mr. Behle recalled that Dr. Haley had asked whether the California Quail had been introduced around Salt Lake City, where it is now numerous, and

cited an article written by J. A. Allen in 1871, which mentions the presence of introduced California Quail. Walter Moore reported a Duck Hawk near Los Baños; there were irrigated farms near-by.

President Miller introduced the French ornithologist, M. Delacour, who spoke briefly on the next International Ornithological Congress, to be held near Paris in May, 1938, extending a cordial invitation to all who might be so fortunate as to be able to attend. M. Delacour expressed his pleasure in attending his first meeting of the Cooper Club, after twelve years of membership.

The speaker of the evening was Mrs. G. Earle Kelly; her topic, "High Lights While Birding—Maine to Florida." In presenting her wealth of observations, Mrs. Kelly emphasized the means of reaching places for profitable bird study, particularly bird sanctuaries, accessible by public transportation from the largest cities. She found the chambers of commerce everywhere most accommodating and also spoke of the cordial welcome extended her by A. O. U. members. She demonstrated a "turkey call" given her by an elderly negro caretaker at McClellanville, South Carolina, a wooden, box-like instrument used to lure wild turkeys by imitating their calls. Perhaps the outstanding experience was a journey from Houston, Texas, to see Roseate Spoonbills on Vingt'un Islands. As a climax to the program, Mrs. Kelly showed moving pictures of the National Association of Audubon Societies' nature camp at the Todd Sanctuary on Hog Island, Muscongus Bay, Maine, where a staff of specialists gives instruction in all phases of Natural History.

Adjourned—FRANCES CARTER, *Recording Secretary.*

DECEMBER.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Thursday, December 17, at 8 p. m., in Room 2503 Life Sciences Building, Berkeley, with President Miller in the chair and about 50 members and guests present. Minutes of the Northern Division for November were read and approved. Minutes of the Southern Division for November were read. An application for membership was read from Mr. Gordon H. True, Jr., 1 Belmont Avenue, San Francisco; proposed by J. M. Linsdale. The proposal of W. Lee Chambers for honorary membership in the club was given first reading, final action to be taken at next meeting.

Mr. Grinnell then brought before the meeting the practical matter of choice of names of birds to be used in a new, revised edition of the list, "Birds of the Berkeley Campus," which he and Miss Wythe are preparing. The choice lay between the use of the full trinomial form in both vernacular and latin names, and two possible, reduced forms. After some discussion, a vote was taken, and the majority proved to favor use of the full trinomial. Mr. Cain, reporting for the conservation committee, called attention to an article by Kenneth A. Reid, in the last issue of *Bird-Lore*, entitled, "We Can't Afford Pollution." Mr. Linsdale reported on plans being made by officials of the recreation department of Berkeley for a bird refuge, similar to that at Lake Merritt, in connection with the aquatic park on the waterfront. Mr. Linsdale had been consulted on planting for the benefit of birds and planned to keep watch of the site.

President Miller suggested that the secretary send a communication to the proper city officials, expressing the appreciation of the club for the work being done. As is customary at the December meeting, the president designated a nominating committee. He appointed J. M. Linsdale, E. L. Sumner, Sr., and Miss Selma Werner.

Mrs. Kelly reported a Mockingbird in the Botanical Garden December 13 and spoke of the establishment of definite territories in this species. E. L. Sumner, Sr., said that apparently no Mockingbirds had nested last spring in Richmond or Albany, as they had done in previous years. Mr. Haley commented on the remarkable influx of Killdeers on the campus and their ceaseless calling at night. A Holboell Grebe was reported from Lake Merritt. Mr. Kinsey told of capturing seven Bush-tits in a water trap, and mentioned the dearth of Varied Thrushes in Marin County this year, as compared with last.

Mr. Frederick H. Test was the speaker of the evening; his topic, "Through the West in Search of 'Hybrid' Flickers." He outlined the distinguishing characters of the Red-shafted and the Yellow-shafted flickers, explaining that the term "hybrid" was here used to denote those birds which exhibited, whatever their origin, some combination of the characters of the two species. The search for breeding places of these "hybrids" took him through ten states during the period from May 29 to July 2, 1936. In presenting the results of his observations, Mr. Test told of proposed experiments to determine the effects of plucking and of hormone injection on the plumage characters. He repeated the request, made at the previous meeting, for reports of flicker roosts, where live birds might be obtained for observation. At the close of the meeting, a tray containing typical specimens of the two species along with a series of "hybrid" individuals was given close examination in the light of the speaker's remarks, by many of the members.

Adjourned.—FRANCES CARTER, *Recording Secretary.*

For Sale, Exchange and Want Column.—Each Cooper Club member is entitled to one advertising notice in any issue of The Condor free. Notices of over ten lines will be charged for at the rate of 15 cents per line. For this department, address JOHN McB. ROBERTSON, Buena Park, California.

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